Three Essays on Marriage, Family Structure and Racial Inequality: The Case of China and Chinese Americans

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Man Xu

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Advisor: Dr. Samuel L. Myers, Jr.

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Abstract

This dissertation is composed of three essays focus on intergroup marriage and female-headed households. I am motivated by recognizing systemic or structural factors affecting marriage outcomes in China and Chinese Americans in the United States.

The first essay, "***Who Gains and Who Loses from Interethnic Marriage? -- Evidence from Western China",*** estimates economic returns from interethnic marriages in China. Until now, interethnic marriage has not been tested as a possibility for overcoming the Han (the majority ethnic group)-ethnic Minzu (the minority ethnic groups) earnings disparity. To test the causal relationship between the Han- ethnic Minzu intermarriage and earnings, I adopt the instrumental variable approach and use the equal-protection clause of interethnic marriage and supportive attitudes towards interethnic marriage as the instruments to identify the causal effect between intermarriage and earnings. The estimates indicate that ethnic Minzu do not gain statistically significant benefits by marrying Han. Furthermore, the returns for Han and ethnic Minzu members from intermarriage are different once controlling the unobserved correlation between Han- ethnic Minzu intermarriage and earnings.

The second essay, "**Linking the Supply of Marriageable Males and Female-Headed Families: the case of China",** measures the linkage between supply of marriageable males to the formation of female headship. Owing to the combination of the One Child Policy and the cultural son preference, China has a persistent male surplus problem. A key insight from the literature posits that the supply of males in the marriage market affects changes in family structure. Focusing on *economic desirability* of unmarried men, rather than just quantity of men, my measure presents a sizeable and negative relationship between male marriageability and female headship for ethnic Minzu, but an insignificant, minimal relation for Han. The

demonstrated ethnic differences relate to potential employment inequality faced by Minorities/Minzu men and the disparate marriage market for ethnic Minzu women in China.

The third essay, "**Anti-Miscegenation Laws, Chinese Exclusion Acts and Interracial Marriages of Chinese Americans between 1880 and 1940",** examines impacts from U.S. anti-miscegenation laws on interracial marriages for Chinese Americans. U.S. Anti-Miscegenation Laws existed at the state level and were made unconstitutional nationwide by Loving v. Virginia in 1967. However, not every state had an Anti-Miscegenation Law, and not every state excluded Chinese from marrying whites. Using the U.S. Decennial Census data from 1880 to 1940 and employing the difference-in-difference estimator, my results show no statistically significant impact from Chinese anti-miscegenation laws on both Chinese males' and females' interracial marriages. This finding is robust to an event history analysis and a synthetic cohort method. The historical ban on Chinese interracial marriages establishes the backdrop of high incidence of Chinese interracial marriages in the 21st century.

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Introduction

Marriage, one of the most intimate personal relationships, provides information on individual preferences and reflects laws and societal inequalities. By answering who marries whom or who is not in the marriage market, we understand more about family and social group formation. Two deviations from the traditional family formation tendencies are intergroup marriage and female-headed households. Studying these deviations helps us understand social boundaries and stratification systems. In addition, the government regulation of marriage plays a vital role in shaping marriage outcomes. However, much of the applied policy analysis literature on marriage outcomes focuses mainly on individual choices and consequences and ignores systemic or structural factors that can affect inequality between groups.

I am motivated by recognizing systemic or structural factors affecting marriage outcomes in China and Chinese Americans in the United States. My dissertation explores how public policies and laws affect deviations from family formation traditions and norms regarding intergroup marriages and female-headed households, resulting in inequalities. Specifically, I study the following three types of structural factors:

1) inter-ethnic marriage policies in China that are designed to create greater unity within the Chinese economy.

2) the remnants of the one-child policy and exemptions afforded to ethnic minorities and their impacts on female-headed families.

3) U.S. anti-miscegenation laws designed to preclude the marriage of Chinese with whites.

I am drawing theories from sociology, demography, and economics while relying on the substance drawn from historical accounts. The dissertation uses analysis grounded in modern policy analysis methods. I am trying to isolate the causal relationships and understand the mechanisms behind the laws and public policies that seemingly affect family formation. Specifically, I am asking the following three questions:

1) Who gains and who loses from inter-ethnic marriages in China as measured by post-marriage incomes.

2) What is the linkage between male quality and the formation of female-headed households in China? And what are the ethnic differences in this linkage between male quality and the formation of female-headed households?

3) What is the impact of the enactment of the Chinese Anti-Miscegenation Laws in the U.S on the Chinese Americans' interracial marriages?

While the literature on intergroup marriage is mainly US-centric, China, a multi-ethnic country, is experiencing a dramatic increase in interethnic marriages. Suggestive evidence shows ethnic minority females marry Han (major group males)

to increase their incomes. This phenomenon of “marrying up” in China has never formally been tested. Unbalanced sex ratios may leave some individuals unmarried and lead to counter-intuitive changes in family structures in China and the rise in female-headed households.

One stream of wisdom from the literature on marriage in the United States reveals that the surplus of males allows females to be more selective about their husband's qualities as measured by education level or economic status. Notably, differences in the formation of female-headed households between ethnic majority and minority group members in China are severely understudied.

To date, most of the studies on the effects of U.S. Anti-Miscegenation laws focus on black-white intergroup marriage. Little quantitative research has directly examined the historical impacts of U.S. Anti-Miscegenation for other minorities, such as the Chinese. Meanwhile, the study of the enactment of Anti-Miscegenation laws on Chinese Americans' intergroup marriages is complicated by the history of Chinese discrimination. The Page Act of 1875 started a series of Chinese exclusion acts to discriminate against all Chinese immigrants. The pervasive view of the Chinese as "unassimilable" approved racial discrimination against the Chinese and added adverse layers to the Chinese experience in the U.S. Moreover, unlike literature on black-white marriages, illustrating that they remained low after the repeal of anti-miscegenation laws, Chinese interracial marriages increased at high incidence once

legitimized in the late 20th and 21st century. Thus, studying the historical laws shows how the increase of Asian-white interracial marriages emerged against a backdrop of prohibition of such marriages in the 19th century and the first half of the 20th century.

Thus, there are still significant gaps in our understanding of interracial and interethnic marriage and family structure for some ethnic minority groups. Addressing these gaps is essential because racial and ethnic inequality is inscribed in traditional family structures and marriage norms. The results from my analysis advance our understanding of how Chinese families are helped or hindered by laws and policies that create or perpetuate ethnic and gender imbalances in the marriage market.

My dissertation contributes to the literature in three substantive ways:

1) The dissertation provides the first estimates of the economic returns to interethnic marriage in China. The instrumental variable estimates indicate that ethnic minorities do not gain statistically significant benefits from marrying Han. The returns for Han and ethnic minority members from intergroup marriage are different once one controls for the unobserved correlation between Han-minority intergroup marriage and earnings. The dissertation differentiates between the effects of ethnic minority women marrying Han men and Han women marrying ethnic minority men.

2) The dissertation produces a novel and adaptive measure of economic attractiveness of males for marriages in China. The results show that there are differing links between marriageable males and the prevalence of female-headed

households between majority Han and minority ethnic groups. There are disparate effects of male supply on family formation in China between ethnic minorities and Han people.

3) The dissertation produces quantitative estimates of interracial marriages among Chinese Americans in the era of the Chinese Anti-Miscegenation Laws and the Chinese Exclusion Acts. The causal study of historical laws indicates the importance of how properly studying historical policy can aid in the understanding of current trends.

Together, these essays provide new insights into the effects of legal and policy interventions affecting marriage and families in China and historically among Chinese in America. The recent upsurge in anti-Asian crimes and the assaults and murders of Asian American women coincide in complex ways with the murder of George Floyd and the escalation of police use of force against African Americans. The xenophobia and racism, must be understood in a historical context and often can be illuminated by examination of specific laws and regulations relating to intergroup interactions. Clearly, the most intimate of intergroup interactions is marriage, making the exploration in this dissertation particularly compelling and policy relevant. The timely study of historical legislation, developing an adaptive measure for mate searching, and estimating the returns from inter-ethnic marriages, deepen our understanding of current circumstances for ethnic minorities in the marriage market.

The knowledge gained from my research helps us understand the family structure as a key to developing, maintaining, and, hopefully, dismantling racial prejudice and inequality.

Essay One: Who Gains and Who Loses from Interethnic Marriage?

--Evidence from Western China

1.1 Introduction

Considerable evidence documents that ethnic minorities (Shao Shu Minzu or Minzu, 少数民族 (Shi, 1999)) and rural residents in China face persistent labor market inequality (Hannum and Xie, 1998; Sicular et al., 2007; Wu and Song, 2014). They have higher poverty rates (Gustafsson and Zhong, 2000; Bhalla and Qiu, 2006; Gustafsson and Ding, 2009; Myers et al.,2013, Gradin, 2015), lower labor force participation rates (Maurer-Fazio, Hughes and Zhang, 2010), lower wage and salary earnings (Zhang and Li, 2001; Ding, Li and Myers, 2013; Wu and He, 2016), and lower incomes in general (Shi and Sai, 2013).

Various studies offer explanations for why Han Chinese are advantaged over ethnic minorities in the Chinese labor market (Sicular et al., 2007; Li and Ding, 2013; Campos et al. 2016, Tang et al., 2016; Hannum and Cheng, 2020). Among all of the theories, ideas from social capital, or more specific to the Chinese case – Guanxi (关系),Chinese expression of personalized social relations, connects individual endowment to social resources. Guanxi embeds in and relies on social networks of reciprocity and exchange (Bian, 1997). Research by Hasmath (2011) and Hasmath and Ho (2015) shows that Han majority members have significantly larger Guanxi networks than ethnic minorities, thereby increasing their social resources and access to jobs. For ethnic minorities, their higher prevalence of rural residence and their

lower levels of Guanxi combine to exacerbate their labor market disadvantage (Gustafsson and Ding, 2009; Zang, 2013).

However, one unsettled argument of whether or how Guanxi accelerates the labor market advantage is from the intermarriage perspective. On one hand, intermarriage may bring new, useful Guanxi ties, which may alleviate ethnic minorities disadvantaged economic situation (Liu and Zhang, 2015). On the other hand, some minority women and children in Xinjiang who intermarried with Han (Li, 2004) were concerned about judgment from friends and employees over their ethnic rituals and traditions since they had to convert their ethnic identity to Han. Furthermore, ethnic minorities who marry Han majority members may be advantaged in other ways (i.e., with higher levels of education, see Hannaum et al., 2010). Until now, interethnic marriage has not been tested as a possibility for overcoming the Han-minority earnings disparity.

Therefore, in this paper, I estimate the returns to intermarriage between majority Han and Minzu. By answering who gains and who loses from interethnic marriages, I test whether Han-Minzu marriage can alleviate inequalities faced by Minzu in the labor market. To identify the causal relationship between Han-Minzu marriage and earnings, I use an instrumental variable approach. My instruments for Han-Minzu marriage are an equal-protection clause of Han-Minzu marriage and supportive attitudes towards Han-Minzu marriage. I find Han-Minzu marriage does not

statistically impact earnings. Rather, the economic returns for Han-Minzu intermarriage vary across gender and ethnic Minzu status. Since there are few empirical studies focus on Han-Minzu intermarriage and earnings, my findings add to our understanding of how different types of marriage affect earnings in Western China. More broadly, this paper contributes to the literature on persistent ethnic inequality and labor market outcome.

In what follows, I first summarize the theoretical framework of intermarriage. Then, I describe intermarriage between Han and Minzu in Western China. Next, I develop the case for two instrumental variables that help to obtain a local average treatment effect of intermarriage on income and test whether and to what degree Han-Minzu intermarriage improves economic outcomes for Minzu. Finally, I provide a discussion of the economic returns to Han- Minzu intermarriage and the policy implications for the marriage market in China.

1.2 Theoretical Framework of Intermarriage

Well-established evidence shows that people tend to marry within their social groups (Kalmijn,1998). This phenomenon is variously known as marital homogamy, endogamy, intramarriage or positive assortative mating[1]. The classic factors on which

[1] To be consistent, in the rest of this paper "intramarriage" will be used to denote homogamy, endogamy and positive assortative mating.

people typically match in the marriage market are education (Mare 1991), race/ethnicity (Kalmijn 1993; Banerjee et al., 2013), and religion (Bisin and Verdier, 2000; Bisin et al., 2004).

Regarding intermarriage,[2] defined as marrying outside one's race, ethnicity, or nationality group, theories suggest several possible determinants. First, demographic structures of the marriage market such as a lack of available partners in one's group may lead to intermarriage (Blau and Fitzpatrick,1984; Tucker and Mitchell-Kernan,1990; Qian and Litcher,2011; Abramitzky et. al, 2011). Second, higher educational attainment increases the probability of marrying outside one's ethnic group. Studies show that compared to people with low educational attainment, people with high attainment have a higher likelihood of marrying partners of different races or religions (Qian, 1997; Kalmijn,1993 and 1998; Gullickson, 2006; Fu, 2008).

Finally, exchange theory (Homans, 1958 and Blau, 1964) and/or utility-maximizing theory (Becker, 1973; Kalmijn, 1993) predict the exchange of one status characteristic for another. For example, one derivative of exchange theory--status-caste exchange--suggests that an ethnic minority member may exchange their higher socio-economic status for their lower position in the ethnic hierarchy by marrying a majority ethnic group member (Han) who has lower relative socio-economic status

[2] In the literature, scholars also use exogamy, hypergamy, heterogamy or negative assortative mating when referring to marriage outside one's group. This paper will use "intermarriage" for consistency.

(Merton, 1941; Schoen and Wooldredge, 1989; Qian, 1997). However, some theoretical and empirical studies find only weak support for the status-caste exchange theory (Bernard, 1966, Porterfield 1978; Hou and Myles, 2013). Instead, recent studies argue that education trumps other status characteristics, such that interethnic or inter-religious marriages are motivated more by similarities in educational attainment than by exchanging differences in status characteristics (Rosenfeld, 2007; Schwartz et al., 2016; Torche and Rich, 2017).

The case of China demonstrates three possible intermarriage scenarios. First, the demographic structure of China is one factor that plausibly influences intermarriage. As many scholars have noted, sex ratios in China are imbalanced – there are significantly more men than women. Intermarriage rates will be higher if the sex ratio is more imbalanced for one specific demographic group. In that case, some members in that group have to marry outside of their group in order to achieve equilibrium in the marriage market (Abramitzky et al., 2011; Bloch and Ryder, 2000). The empirical evidence from 1982, 1990 and 2000 China census data analyzed by Jia and Persson (2021) finds that when the Han male-to-female sex ratio goes up by one standard deviation, the probability of intermarriage between a Han man and an ethnic minority woman goes up by 3.4 percentage points. The same pattern holds among ethnic minorities as well: when the Minzu male to female sex ratio goes up, the probability of intermarriage between a Minzu men and a Han woman increases.

Second, the role of human capital accumulation in intermarriage also plays out in China. Recall that this perspective suggests that intermarriage rates will be higher for highly educated groups (Liu and Zhang, 2015). This is because college increases opportunities to associate with youth from other ethnic groups (Jian, 2017). Further, the location of universities in large Chinese cities increases the probability of meeting people dissimilar from oneself and decreases parental influence on children who move away from home for college (Mare,1991; Rosenfeld, 2007; Jian, 2017). In addition, the influence of education on intermarriage may work through language proficiency. Jian (2017) finds a relatively high rate of intermarriage between Han majority group members and ethnic Mongolians who speak Mandarin, suggesting that language is a conduit for interaction between groups. Of course, higher levels of education are associated with greater Mandarin language proficiency. However, in a phenomenon that may be unique to China, ethnic minorities who hold at least a bachelor's degree learn ethnic theory in university, which enhances their own ethnic consciousness and may further strengthen their orientation toward fellow members of their ethnic group as marriage partners (Jian, 2017). In this perspective, a higher level of educational attainment may *decrease* interethnic marriage.

Finally, from an exchange theory perspective, an incentive of exchanging resources between couples also increases intermarriage rates (Becker,1973). Spouses can compensate for their disadvantages by exchanging resources, such as Hukou, a

Chinese household registration system (Tian et al., 2018; Wang and Schwartz, 2018), age (Mu and Xie, 2014), family background (Lui, 2016), and/or skills (Yu and Xie, 2015) to maximize personal and household utility. For example, using the China 2005 1% Inter-Census data, Mu and Xie (2014) discovered that status exchange dominates the age intermarriage pattern after the 1990s. Intensified labor market pressures explain marriages of older men to younger women on the basis of exchange theory – that is, he exchanges his higher career status for her relative youth (a desirable trait in wives).

Lastly, and unique to the case of China, the one-child policy, in effect from 1978 to 2015, induced higher interethnic marriage rates because of its exemption for interethnic couples – that is, ethnic minorities did not need to abide by the one-child policy (Huang and Zhou, 2015)[3]. With the exemption, a couple with at least one ethnic minority member could legally have a second child (Gu et al., 2007). If a Han majority member desired a family with two children, they had a strong incentive to marry an ethnic minority member.

In summary, interethnic marriage in China demonstrates both the patterns suggested by the existing literature and the special circumstances driven by ethnic education and the one-child policy. Patterns consistent with demographic forces, educational attainment, and exchange theory prevail in the Chinese case.

[3] Zhuang and Manchu are excluded in some provinces.

1.3 Legal Protection of Han-Ethnic Minzu Intermarriage

Preservation of ethnic group identity is the main reason for social and legal sanctions against intermarriage (Li,2006; Ma, 2001). Social taboos and the legal status of Han-Minzu intermarriages were of concern to Chinese governments since the 1950s (Zhang, 1987). The 1950 marriage law legalized marriage freedom and intermarriage for men and women. Every edition of the marriage law of the People's Republic of China since 1950 (1950, 1980, 2001 and 2020) includes articles similar to these[4]:

> Article 2: A marriage system based on the free choice of partners, on monogamy and on equality between man and woman shall be applied.
>
> Article 5: Marriage must by based upon the complete willingness of both man and woman. Neither party may use compulsion on the other party and no third party may interfere.

One interpretation of the above articles is equal protection of intermarriage between Han and ethnic minority people. Nonetheless, the last article in all versions of the marriage law emphasizes that:

[4] Appendix Table 1.1 lists all articles relevant to intermarriage from different versions of the national marriage law.

"… The people's congresses in national autonomous areas shall have the right to formulate certain adaptations in light of specific conditions of the local nationalities in regard to marriage and family. …"

These special articles acknowledge 1) marriage and family formation are different in ethnic minority areas compared with the rest of the country, and 2) intermarriages are different from intramarriage in ethnic minority areas.

Meanwhile, in 'Reply of the Ministry of the Interior on the issue of interethnic marriage', state council stressed that "… [to] respect the ethnic cultural and religious customs, and for the unity of Han and ethnic minorities, persuade a man and women not to marry if the ethnic tradition does not allow intermarriage". Consequently, interethnic marriage was legal but not encouraged from the 1950s to the 1980s.

With the revision and implementation of the 1980 marriage law, autonomous local governments started to formulate and implement local intermarriage adaptations to the national marriage law. Appendix Table 2 lists all the provincial-and county-level adaptations of the national marriage law in ethnic minority residential areas from the Wolters Kluwer Legal & Regulatory Database. All the local adaptations approved a lower legal minimum age for marriage, which is two years younger than the national requirement (men: 22 years old, women: 20 years old) for both men and women. However, not every adaptation underlines equal protection of interethnic marriage. Sometimes, respect for ethnic marriage traditions conflicts with equal

protection of interethnic marriage. In reality, interethnic marriage is not entirely recognized by ethnic customs and cultures. As Li (2006) suggests in a study of marriage policies in Xinjing, civilian authorities do not promote but do protect interethnic marriage among Uyghurs and Kazakhs. Civilian authorities help young couples persuade their parents to agree to their intermarriage. In sum, despite being legal since the 1950s, the taboo of interethnic marriage has not completely disappeared from ethnic minority autonomous areas.

1.4 Data and Method

1.4.1 Ethnic Minzu and Chinese Household Ethnicity Survey (2011)

Members of 55 different Minzu groups compose about nine percent of the Chinese population according to the 2010 China census and the 2015 one percent population survey. Nearly 80 percent of all Minzu are from ten groups. ***Table 1.1*** presents the ten largest Minzu groups in China, consistent across both the 2010 census and the 2015 one percent population survey. The bolded residential provinces are home to the five designated Minzu autonomous regions – most of which are rural and in the Western regions of China. However, some Minzu groups like Hui and Miao are spread across the country. Because of the relatively small Minzu population size and their concentrated residential patterns, it is difficult for nationally representative surveys to generate a sample of Minzu large enough to study intermarriage in China. This study

employs the China Household Ethnicity Survey 2011 (CHES 2011), a survey that purposely oversamples Minzu and rural areas (Gustafsson, Hasmath, and Ding, 2020). CHES 2011 was initially designed to collect both rural and urban households from eight western provinces or Autonomous Regions, the traditional minority areas. However, due to political reasons and data quality issues, Tibet Autonomous Region and Yunnan Province were not included. To minimize the loss of two minority areas, CHES sampled Hunan province and autonomous prefecture in Qinghai. In total, they are the seven CHES provinces.

[Insert Table 1.1 here]

In ***figure 1.1***, colored provinces are the provinces included in the CHES. The provinces in blue indicate Minzu autonomous regions. The names of Minzu autonomous regions are based on the Minzu group with the largest share of the population in that province. For example, Nei Mongol derives its name from the disproportionate share of ethnic Mongolians. In general, Minzu autonomous regions have more legislative rights than a regular province.

[Insert Figure 1.1 here]

The China Household Ethnicity Survey 2011 interviewed approximately 6,000 people in seven of the top ten Minzu concentrated provinces, generating a total study sample of 41,733. The average Minzu share in the CHES sample is 59 percent, and all 55 Minzu groups are represented in the sample. As ***table 1.2*** suggests, the average

Minzu share in the sampled seven provinces and autonomous regions is 26 percent of the total population according to the 2010 Census, which is almost three times the nationwide Minzu population share. ***Table 1.2*** also indicates that CHES sampling is undertaken in such a way that numbers of observations from selected provinces are not proportional to the size of the province. To the extent that the ethnic composition of the CHES provinces differs from the rest of the country, it is possible that the advantaged minorities in the CHES survey overshadow the less advantaged minorities elsewhere when looking at data in the aggregate. Therefore, I weight the urban and rural subsamples and Han and Ethnic Minzu so that their population shares are equal to those in the total population according to Census-based population.

[Insert Table 1.2 here]

1.4.2 Measures

My dependent variable is annual earnings, which includes wages and salary, operating income, and property income such as rental income. Income is measured in 2011 Chinese yuan (RMB) and is captured in a continuous format with a range of 1,770 to 816,000 RMB. My primary independent variable of interest is Han-Minzu intermarriage. The survey asks respondents their own and their spouse's ethnicity. A dummy variable coded '1' indicates a case of Han-Minzu intermarriage, and '0' indicates a Han-Han marriage.

I combine the 55 Minzu groups together to create a representative and larger sample for Minzu groups. I recognize that there is heterogeneity between ethnic groups on many dimensions, but all ethnic groups are economically disadvantaged relative to the Han majority in China. For the purposes of understanding economic position and changes therein, combining Minzu groups in this way should not undermine my findings, but I acknowledge that it may obscure some nuance.

Other independent variables include *rural to urban migrant worker status* which equals '1' if the respondent migrated from a rural area to a city for work lasting at least three months. The indicator for *rural residency* equals '1' if the respondent lived in a rural area during 2011. The respondents' *level of education* is measured by the highest level of academic attainment coded into six categories: 1) no schooling, 2) less than high school, 3) high school completion, 4) secondary vocational high school or technical high school, 5) some college but not a four-year degree, and 6) a college or higher degree. Each of the above attainment levels has its own corresponding binary indicator. As suggested by the literature, a binary variable of *Chinese Community Party membership* measures political capital with '1' reflecting CCP membership. Religious influence is measured by *Muslim status*, the most consequential religious group for intermarriage in China due to how embedded its practices are in daily life (Zang, 2005). A *province* indicator is created for the seven

sampled areas and a provincial level fixed effect is included that captures province level differences. Lastly, age and age squared are controlled as continuous variables.

1.4.3 Empirical Framework

The primary interest of this paper is to estimate the economic returns to Han-Minzu marriage, and test whether Han-Minzu marriage can alleviate the income inequality ethnic Minzu members face in the labor market. Therefore, we keep everyone who is of official working age (between 16 to 60) and in the labor market. To test the relationship between Han-Minzu marriage and earnings and to gain some traction on the causal nature of this relationship, we must disentangle earnings from other characteristics that contribute to a Han-Minzu intermarriage, or the reverse causal relationship between intermarriage and earnings. To this end, I use an instrumental variable approach.

$$\ln\,(annual\ earnings)_j^k = \beta_0 + \beta_1 IM_j^k + \beta_1 MINZU_j^k + \beta_3 X_j^k + \gamma_k + \varepsilon_j^k \quad (1)$$

ε: random error, j: individual; k: province

γ_k: province fixed effect

IM: Han-Minzu marriage

Equation (1) presents the baseline, Ordinary Least Squares (OLS) estimation of the economic returns to Han-Minzu intermarriage indexed by the log of annual earnings. The controls include Minzu status, Chinese Community Party membership, educational level, age, Muslim identity, rural to urban migrant worker status, self-

employed status, and a provincial level fixed effect. With the presence of unobserved confounding factors that relate to both Han-Minzu intermarriage and earnings, the estimates from Equation (1) could be biased in either direction. Following the instrumental variable estimation strategy, I conduct the Two-Stage Least Squares regression (2SLS) specified in Equation (2) and Equation (3). Equation (2) represents the first-stage specification and Equation (2) is the second-stage estimation.

$$IM_j^k = \alpha_0 + \alpha_1 EP_j^k + \alpha_2 Atti_j^k + \alpha_3 X_j^k + \gamma_k + \varepsilon_j^k \qquad (2)$$

$$\ln (annual\ earnings)_j^k = \beta_0 + \beta_1 \widehat{IM_j^k} + \beta_1 MINZU_j^k + \beta_3 X_j^k + \gamma_k + \varepsilon_j^k \qquad (3)$$

ε: random error, j: individual; k: province

γ_k: province fixed effect

IM: Han-Minzu marriage

EP: Ever had a local equal protection clause for Han-Ethnic Minzu intermarriage

Atti: Support intermarriage for their children

$\widehat{IM_j^k}$: predicted Han-Minzu intermarriage probability from Equation (2)

where the dependent variable of Equation (2) is a binary variable, *IM*, indicating a Han-Minzu marriage *j* in province *k*. The key independent variables are 1) the binary indicator for ever having a local equal protection clause for Han-Ethnic Minzu *(EP*) intermarriage and 2) a binary indicator for a favorable attitude toward intermarriage for the respondents' children (*Atti*). Other independent variables in Equation (2)

include a vector of individual level characteristics (*X*) including gender, Chinese Community Party membership, educational level, age, Muslim identity, and a provincial level fixed effect.

An appropriate instrument must directly affect the key independent variable of interest (Han-Minzu intermarriage) but not be correlated with the dependent variable (earnings) (Greene, 2013). For the instrumental variables, I use a binary indicator of whether there has ever been a local regulation or amendment to the national marriage law that mentions equal protection for intermarriage (equal protection clause of Han-Ethnic Minzu intermarriage); and an indicator of attitudes toward intermarriage for respondents' children. From a marriage perspective, the equal protection clause directly affects the probability of intermarriage between Han and Minzu because it protects marital rights. This satisfies the 'relevance assumption' for instrumental variable selection (Greene, 2013). At the same time, an equal protection clause, itself, does not relate to earnings, satisfying the 'exclusion restriction' requirement for instrumental variables (Greene, 2013)[5].

A major threat to the validity of the instrumental variable is the dynamic selection into Han-Minzu intermarriage. If an individual migrated to or out of their current location due to concerns about their marriage in terms of community support

[5] Province- and age-specific sex ratios helps control for selection into intermarriage, but it cannot control for the martial dissolution of individuals after they marry.

or cultural taboos, the equal protection clause at the migration destination does not necessarily apply to his/her probability of Han-Minzu marriage. While I do not have full information about migration incentives, one question in the CHES asks migrants who moved in the last year about their migration motivations. In this question, the response options do not include marriage, but respondents could include a marriage motivation in the "other" category. Only five percent of respondents chose "other," and therefore marriage is an unlikely primary motivation for most in-migrants. Based on a study using Chinese Census data (Davin 2007) for the provinces in the CHES sample, only one province (Nei Mongol) has a sizeable proportion of in-migrants who may have migrated for marriage. Even in this case (Davin 2007), migrating for marriage is no more than 25% of all in-migration. For remarried individuals, the marriage market is slightly different than for those in first marriages, and the surplus of men could be either positively or negatively correlated with the probability of Han-Minzu intermarriage. My estimates cannot distinguish the direction of bias.

It is important to keep in mind that the instrumental variable estimates are local average treatment effects (LATE) that only apply to those whose decision to intermarry was affected by the equal protection clause in their current location (the "compliers"). Moreover, if Han-Minzu intermarriage would help alleviate the earning penalty faced by Minzu people, the LATE estimates could underestimate the positive

Han-Minzu intermarriage effect on income because the LATE estimates do not capture the effects of "always takers" of Han-Minzu intermarriage.

My second instrument is attitudes toward inter-ethnic marriage. The China Household Ethnicity Survey 2011 asks respondents whether they agree that their children may marry persons from an ethnic group other than their own (Han or another ethnic group). I define a dichotomous instrument, equal to '1' if the respondent supports (赞成) intermarriage for their children and '0' for neutral (无所谓) , as if they do not agree (不太赞同), are unclear, or do not have an opinion (说不清). This instrumental variable meets the 'relevance assumption' in that the attitude positively corelates to intermarriage, and it also meets the 'exclusion restriction' because the attitude should not directly have an impact on earnings.

1.5 Results

1.5.1 Descriptive Statistics

Among the 41,733 interviewed individuals in CHES, 18,256 are married, and 1,866 individuals are intermarried. Eighty percent of the intermarried individuals are Han-Minzu intermarried (the remainder are in intermarriages between those of different Minzu groups or between Chinese nationals and non-Chinese). These 80 percent are the couples I refer to as "intermarried" or "interethnic." Considering the structural differences between farm earnings and labor income (Li and Sicular, 2014), the

analytical sample is restricted to persons whose primary revenue in the year 2011 was from labor income, which includes rural local workers, rural to urban migrant workers and urban workers between the ages of 16 and 60. Therefore, my analytical sample has 9,028 married individuals with 1,042 of these respondents in Han-Minzu intermarriages. Fifty-four percent of the interethnic couples have a Han husband and a Minzu wife, which reveals a slight gender selection pattern in Han-Minzu intermarriage. For this reason, subsequent analysis will be separate for men (n=5,956) and woman (n=4,114). ***Figure 1.2*** presents the annual earnings by marriage type and Minzu status separately for women and men. Intermarried individuals have higher average annual earnings than intramarried individuals. While there is no statistical difference in the average annual earnings of Han men and women who are in intermarriages compared to those in intramarriages, we can see statistically significant differences in the average annual earnings of Minzu men and women who are in intermarriages compared to those in intramarriages.

[Insert Figure 1.2 here]

Table 1.3 displays the descriptive characteristics separately for women and men. On average, intermarried individuals are less likely to live in rural areas or to be rural to urban migrant workers. Among Han-Minzu intermarried women, only nine percent are migrant workers, while 11 percent of intramarried women are migrant workers.

Men demonstrate an even greater contrast: eight percent of Han-Minzu intermarried men are migrant workers, while 18 percent of intramarried men are migrant workers. Those who are in Han-Minzu intermarriages are more likely to be CCP members than those who are not intermarried, which is true for both women and men. This may relate to the send-down policy of the 1950s, where the CCP sent a significant number of party members to western and rural China to enhance assimilation between Han and Minzu groups; this may have produced many Han-Minzu couples that include a CCP member.

Consistent with existing theory, a much lower proportion of Muslims are in intermarriages than those from other religions; only one percent intermarried individuals are Muslims. The China Household Ethnicity Survey 2011 also confirms that higher educational achievement is associated with more Han-Minzu intermarriage. People who have any education beyond a high school diploma are more likely to be in Han-Minzu intermarriages. For example, for men who have a college degree or higher, the share of Han-Minzu intermarriage is more than 20 percentage points higher as compared to those with only a high school degree. In short, descriptive statistics from the CHES sample are consistent with intermarriage patterns suggested by the literature, such as differential prevalence by Muslim religion and by educational attainment.

[Insert Table 1.3 here]

Further, when partitioning the educational attainment by marriage type, we can see strong evidence of selection for Han-Minzu intermarriage at the upper end of the education distribution as ***Figure 1.3*** suggests. About twice as many individuals with some college education or more are Han-Minzu intermarried, while for those with less than a high school degree the pattern goes in the opposite direction—they are more likely to marry within their ethnic groups. As Han-Minzu intermarried individuals are positively selected on education, it is reasonable to suspect they are also positively selected on other observed and unobserved traits that could also increase expected earnings, like abilities and motivation.

[Insert Figure 1.3 here]

1.5.2 Ordinary Least Squares and Two-Stage Least Squares Results

Table 1.4 presents the main results for the effect of Han-Minzu intermarriage on income for women and men. Columns (1) and (4) show the Ordinary Least Squares (OLS) results for the effect of Han-Minzu intermarriage on income for women on the left and men on the right. Without controlling the selection into Han-Minzu marriage, Han-Minzu intermarriage increases income for women by 13 percent and 12.5 percent for men. Columns (2) and (5) in ***Table 1.4*** show the first stage of the IV estimation, regressing the probability of Han-Minzu intermarriage on the binary indicator of ever

having a local equal protection clause for Han-Ethnic Minzu intermarriage and a supportive attitude toward Han-Minzu intermarriage. As expected, supportive attitudes toward intermarriage are associated with a nine percent higher probability of being in an intermarriage for women and a seven percent higher probability for men.

In contrast, ever having had a local equal protection clause for Han-Ethnic Minzu intermarriage statistically significant decreases the probability of Han-Minzu intermarriage for women by four percent and for men by five percent. The province and county ethnicity history can explain the negative association between an equal protection clause and the probability of intermarriage. As Appendix Table 1.2 suggests, equal protection clauses are more common in provinces and counties where ethnic Minzu groups have stronger and deeper ethnic identities. Rather than the clause dampens the interracial marriage likelihood, the social pressure and potential criticism from the community intimidate people not to intermarry even with legal rights and protection. Columns (3) and (6) of ***Table 1.4*** present the second stage of the IV results, the casual effect of Han-Minu intermarriage on earnings. With the instruments, the statistically significant effect from Han-Minzu intermarriage disappears for both women and men. With an F statistic of over 30 for both men and women, weak instruments are not a concern under the current specification.

[Insert Table 1.4 here]

The intersectionality between gender and ethnicity may also introduce selection into Han-Minzu intermarriage. Consequently, the marriage effect on earnings may be different for ethnic-Minzu women and Han women and ethnic-Minzu men and Han men. Therefore, ***Table 1.5*** presents the estimations separately by gender and ethnicity. Similar to the main results, the IV estimator does not generate statistically significant effects from intermarried status to earnings. Meanwhile, across specifications and gender, higher educational achievement greatly increases incomes for both inter- and intra-married men and women. More importantly, the impact of the same educational level on income is two times greater for women than men. Educational achievement plays the most important role in determining earnings among all the factors considered.[6] This is consistent with human capital theory as an explanation for inequality in China.

[Insert Table 1.5 here]

Importantly, we need to understand that the IV estimates are the local average treatment effects (LATE) of an equal protection clause and supportive attitudes toward Han-Minzu intermarriage to income. The effect only applies to those whose decision to be Han-Minzu intermarried was affected by an equal protection clause ("compliers"). The effect is not necessarily applicable to those who will always get Han-Minzu intermarried (the "always takers") or those who will remain single or

[6] The full regression results can be found in Appendix Tables 3, 4 and 5.

never be Han-Minzu intermarried (the "never takers") regardless of the value of their instruments.

Besides the local average treatment effects (LATE), to address the concern that there might be a large number of defiers who violate the monotone assumption and a small number of compliers, I will apply the bounds estimation for the instrumental variable (Black, Berger and Scott, 2000; Manski and Pepper, 2000; Balke and Pearl, 1997). The bounded estimates provide the tightest returns from Han-Ethnic Minzu intermarriages, given the distribution of compilers.

1.6 Discussion and Policy Implications

This study provides new evidence on the economic returns to Han-Minzu intermarriage by exploiting the plausibly exogenous marriage gains that are caused by laws and regulations as well as parental attitudes toward intermarriage. This paper indicates that the economic returns for Han and Minzu from Han-Minzu intermarriage are different after controlling for the selection into Han-Minzu intermarriage. These findings do not agree with the idea in the existing literature that Minzu women "marry up" with regard to income (Li, 2004). The non-significant intermarriage effect on earnings is consistent with prior findings in the literature that intermarried individuals face either a negative or non-significant wage premium (Meng and Gregory, 2005; Crowder and Tolnay, 2000). This new evidence contributes to our understanding of

the preference and sorting mechanism, including educational assortative mating, in the marriage market in Western China. Through Guanxi is not directly observed in my dataset and I cannot draw any conclusion on Guanxi from my results, it is not hard to imagine the Han-ethnic Minzu intermarried individuals connect to new networks by marrying someone from a different ethnic group. The new connection may not be strong, but it brings exclusive information, cooperation, and even benefits to which outsiders do not otherwise have access.

My results are subject to several limitations. First, the CHES data, unfortunately, do not contain the marriage year or where respondents lived when they married. My instrument is valid for residents who live and marry at their current residential place, and not for migrants who migrated for marriage. Though China experiences vast rural to urban migration in the past three decades, the migrant share of the total population is less than 5 percent before 1995 (Lu and Xia, 2019), which is the cut-off birth year for the youngest people in my analytical sample. Thus, my instrument applies to most of the individuals in the sample. Second, my model and empirical analysis look into the effects of Han-Minzu intermarriage and earnings but do not take other dimensions into account, including the impacts of the one-child policy fertility incentives on Han-Minzu intermarriage. As Huang and Zhou (2015) and Huang et al. (2016) suggested, the one-child policy increased Minzu births, especially among Han-Minzu couples. Children from Han-Minzu couples are more

likely to intermarry. Therefore, among the children of Han-Minzu intermarried parents in the sample, my estimates may be upwardly biased. The first cohort of children from Han-Minzu couples under the one-child policy era are around thirty years old. Without knowing the parents' ethnicity, I cannot estimate how large the bias may be. However, even the oldest cohort is much younger than the average age of my sample, which suggests any bias introduced by their inclusion is likely minimal.

While still relatively small, the Minzu population in China is growing. Recent amendments to China's constitution emphasize the importance of harmony and social cohesion between Han and Minzu. Marriage has long been considered a basic cell of society, an institution that promotes social and political stability (Fincher, 2016). Han-Minzu intermarriage may be seen as one pathway to the harmony and social cohesion promoted by the Chinese government. My findings indicate that intermarriage is most common among those with higher levels of education, suggesting that the income benefit derived from Han-Minzu marriage accrues to those who already have some resources in the form of human capital. Therefore, in my sample, the benefits of Han-Minzu intermarriage are for those who are already relatively advantaged.

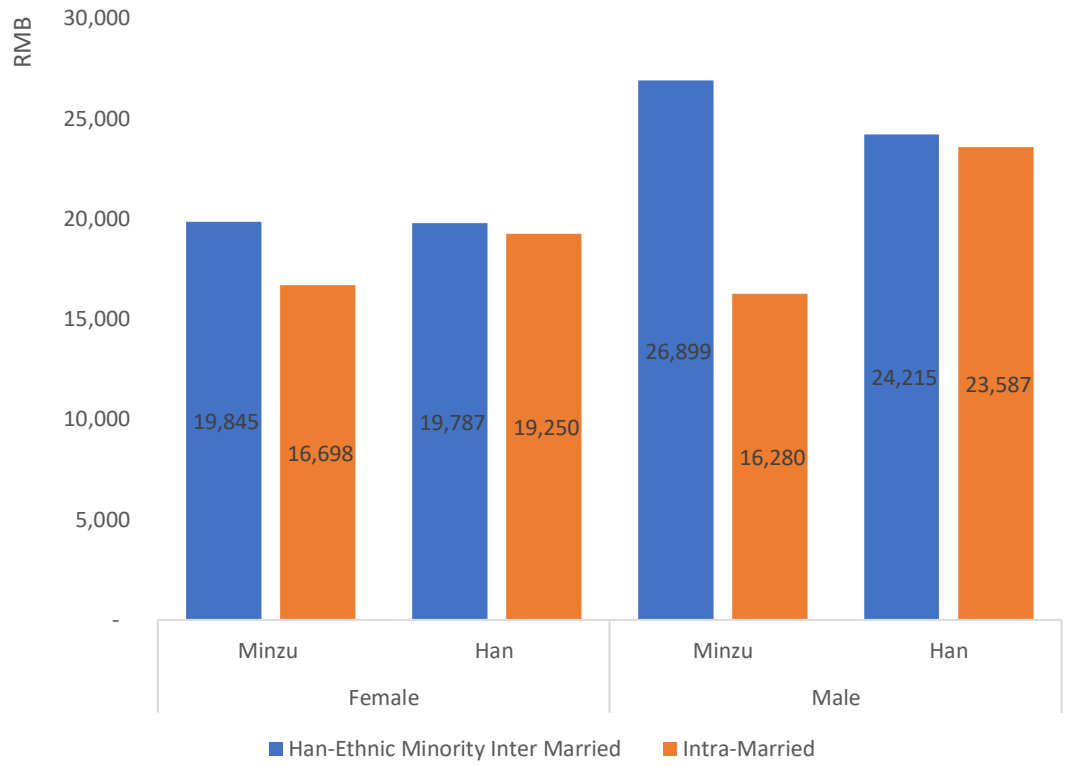
For scholars and policymakers who seek to promote intermarriage as a path to harmonious relations between Han and Minzu groups, their focus should be on those

persons at the lower end of the educational distribution where interethnic marriage is less common. Scholars and policymakers interested in marriage prospects should consider what, if any, unique benefits derive from marriage for this group. Finally, the Chinese government believes greater integration between ethnic groups is positive for China, but my findings indicate that no particular group statistically benefits economically from this most personal kind of integration – that of marriage. However, some scholars suggest that integration may also serve to erase the unique identities and cultures of Minzu groups in China -- homogenizing all Chinese to one Han culture. Future studies could seek an even more nuanced understanding of social cohesion and Minzu identity under the framework of inequality and marriage.

Figure 1. 1: Map of the CHES Provinces

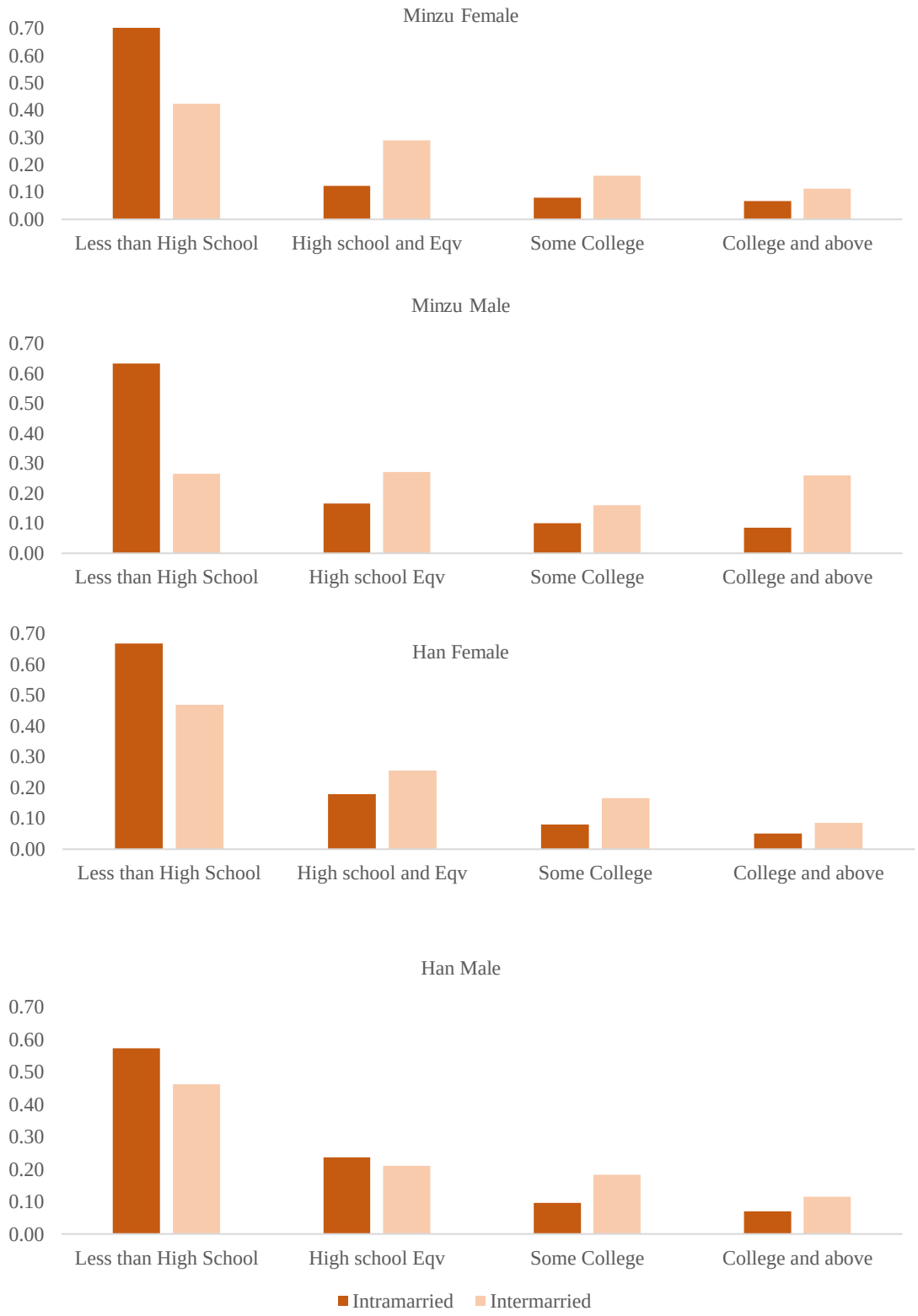
Note: Green represents province.
Blue represents Minzu autonomous region.

Figure 1. 2: Annual Earnings by Marriage Type in Western China



Source: CHES 2011.
Notes: Figure 1.2 includes married people between ages 16 to 60.

Figure 1. 3: Educational Attainment by Marriage Type in Western China



Source: CHES 2011.

Notes: Figure 1.3 includes married people ages 16 to 60.

Table 1. 1:Largest Ten Ethnic Minzu Groups in China

	2010 Census		2015 1% Population Survey		Own Language	Main Residential Province
	Population Size	% Of Total Population	Population Size	% Of Total Population		
Zhuang	16,926,381	1.27	279,744	1.31	Yes	**Guangxi Zhuang**, South China
Hui	10,586,087	0.79	175,072	0.82	No	**Ningxia Hui,** whole country
Manchu	10,387,958	0.78	165,186	0.78	No	Northeast China
Uyghur	10,069,346	0.76	172,258	0.81	Yes	**Xinjiang Uyghur**
Miao	9,426,007	0.71	144,707	0.68	Yes	Whole country
Yi	8,714,393	0.65	136,728	0.64	Yes	Southeast China
Tujia	8,353,912	0.63	138,383	0.65	Yes	Hunan, Hubei, Chongqing
Tibetan	6,282,187	0.47	108,114	0.51	Yes	**Xizang Tibet**, Qinghai, Sichuan
Mongolian	5,981,840	0.45	95,960	0.45	Yes	**Nei Mongol**, Northeast China
Dong	2,879,974	0.22	47,409	0.22	Yes	Guizhou, Hunan
Total	89,608,085	6.72	1,463,561	6.87		

Source: Tabulation of the 2010 Population Census of the People's Republic of China.

Tabulation of 2015 One-Percent Population Survey of the People's Republic of China.

Table 1. 2: Sample Size by Province and Autonomous Region in the 2011 CHES

Province/Autonomous Region	Sample Size	Ethnic Minority Share in the CHES	Population in 2010 Census	Ethnic Minority Share in the 2010 Census
Hunan Province	6,202	70.32	65,700,762	9.97
Guangxi Zhuang Autonomous Region	6,367	57.17	46,023,761	37.17
Guizhou Province	6,410	79.29	34,748,556	18.81
Ningxia Hui Autonomous Region	5,786	47.50	6,301,350	35.15
Qinghai Province	6,361	54.01	5,626,723	46.98
Xinjiang Uygur Autonomous Region	5,634	66.54	21,815,815	59.52
Inner Mongolia Autonomous Region	4,973	28.19	24,706,291	20.46
Total	**41,733**	**58.43**	**204,923,258**	**25.91**

Source: Tabulation of the 2010 Population Census of the People's Republic of China.

CHES, 2011.

Table 1. 3: Characteristics of Sample by Intermarried Status and Gender

	Female						Male					
	Intramarried			Han-Minzu married			Intramarried			Han-Minzu married		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Rural Residency	0.43	0.50	3,630	0.21	0.41	484	0.51	0.50	5,398	0.26	0.44	558
Minzu	0.29	0.45	3,630	0.33	0.47	484	0.33	0.47	5,398	0.28	0.45	558
Migrant worker	0.11	0.32	3,630	0.09	0.28	484	0.18	0.39	5,398	0.08	0.27	558
Muslim	0.11	0.31	3,630	0.01	0.12	484	0.15	0.36	5,398	0.01	0.10	558
Member of Communist Party of China	0.12	0.32	3,630	0.19	0.39	484	0.22	0.41	5,398	0.34	0.47	558
Education:												
No schooling	0.05	0.21	3,630	0.01	0.11	484	0.02	0.14	5,398	0.01	0.09	558
Less than High School	0.54	0.50	3,630	0.37	0.48	484	0.55	0.50	5,398	0.37	0.48	558
Technical High School or Upper College	0.08	0.27	3,630	0.13	0.34	484	0.07	0.25	5,398	0.09	0.29	558
High school	0.12	0.33	3,630	0.15	0.36	484	0.16	0.36	5,398	0.14	0.34	558
Some College	0.12	0.32	3,630	0.20	0.40	484	0.11	0.31	5,398	0.19	0.40	558
College or higher degrees	0.08	0.28	3,630	0.11	0.32	484	0.08	0.28	5,398	0.17	0.38	558
Living in autonomous region	0.61	0.49	3,630	0.34	0.48	484	0.60	0.49	5,398	0.36	0.48	558
Age	41.30	9.68	3,630	41.95	9.25	484	42.21	9.55	5,398	43.75	8.52	558

Source: CHES 2011.

Notes: Table1.3 includes married people ages 16 to 60. Weights are applied to the analysis.

Table 1. 4: The Impact of Han-Minzu Intermarriage on Income in Western China

	(1)	(2)	(3)	(4)	(5)	(6)
		Female			Male	
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Han-Minzu Intermarriage	0.1317***	.	0.1598	0.1254***	.	-0.0979
	(0.0507)	(.)	(0.3640)	(0.0375)	(.)	(0.3751)
Minzu Status	-0.1153***	0.0785***	-0.1118**	-0.1589***	0.0235**	-0.1617***
	(0.0393)	(0.0141)	(0.0511)	(0.0278)	(0.0114)	(0.0321)
Ever had a local equal protection clause of Han-Ethnic Minzu		-0.0412**			-0.0484**	
		(0.0187)			(0.0224)	
Support Han-Minzu Intermarriage		0.0919***			0.0666***	
		(0.0124)			(0.0099)	
Instrument F-statistics		31.5716			25,3868	
Observations	4,114	4,045	4,045	5,956	5,855	5,855

Source: CHES 2011.

Notes: Table1.4 includes married people ages 16 to 60. Weights are applied to the analysis.

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 1. 5: The Impact of Han-Minzu Intermarriage on Income in Western China by Gender and Ethnicity

	(1)	(2)	(3)	(4)	(5)	(6)
Ethnic-Minzu		Ethnic-Minzu -Female			Ethnic-Minzu -Male	
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Han-Minzu Intermarriage	0.0677	.	0.5588	0.2663***	.	0.1852
	(0.0792)	(.)	(0.8654)	(0.0482)	(.)	(0.4005)
Ever had a local equal protection clause of Han-Ethnic Minzu		-0.0469			-0.1985***	
		(0.0448)			(0.0273)	
Support Han-Minzu Intermarriage		0.0591***			0.0227*	
		(0.0177)			(0.0127)	
Instrument F-statistics		6.2413			27.7839	
Observations	2,099	2,072	2,072	3,266	3,214	3,214
	(7)	(8)	(9)	(10)	(11)	(12)
Han		Han -Female			Han -Male	
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Han-Minzu Intermarriage	0.1336**	.	-0.0164	0.0766	.	-0.1007
	(0.0672)	(.)	(0.4640)	(0.0495)	(.)	(0.4331)
Ever had a local equal protection clause of Han-Ethnic Minzu		-0.0451*			0.1013**	
		(0.0251)			(0.0395)	
Support Han-Minzu Intermarriage		0.0997***			0.0795***	
		(0.0171)			(0.0148)	
Instrument F-statistics		19.4717			17.771	
Observations	2,015	1,973	1,973	2,690	2,641	2,641

Source: CHES 2011.

Notes: Table1.5 includes married people ages 16 to 60. Weights are applied to the analysis.

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Essay Two: Linking the Supply of Marriageable Males to the Formation of Female-Headed Families: The Case of China

2.1 Introduction

It is a common belief that a man heads a Chinese family. This idea is displayed on the official page for household heads in the Chinese household registration system (Hu Kou, 户口). It is assumed widely in social life as men are called the family decision-makers (Yi Jia Zhi Zhu, 一家之主 or Zhu Xin Gu, 主心骨). This pattern is also typical for dual-earner families and is a deeply held belief related to male preferences and gender inequality (Zuo and Bian, 2001). Along with Chinese marriage and family structure changes, female-headed households or female headships have emerged in China. Recent births cohorts express more egalitarian attitudes towards female headship in both labor market outcomes and private family affairs (Qian and Li, 2020). Scholars posit that emerging Chinese female headship is related to internal migration (Goldstein et al., 1997; Mu and Van de Walle, 2011; Ye et al., 2013; Cheung and Yeung, 2015; Chen et al., 2015), the evolution of gender equity (Zuo, 2003; Qian and Sayer, 2016; Ji, et al., 2017; Ye and Zhao, 2018), and high educational achievement (Ji, 2015).

My interest is in investigating the link between the supply of marriageable males and the formation of ***unmarried*** female family headship while examining the trends in unmarried female family headship in China from 1982 to 2000. Unmarried

female family headship in China is less well-studied, and differences between Han and Minzu are largely ignored. For example, Xie, Cheng, and Zhou (2015) and Dong and Xie (2018) have discussed the mechanisms and consequences for female family headship arising from the surplus of males in China without a detailed analysis of ethnic differences. With the limited literature on female family headship in China, this paper contributes to the literature by providing an empirical test of marriageable males on family structure among Minzu vs. Han in China. Further, the paper will test the disparate ethnic impacts of male marriageability and unmarried female headship between Minzu vs. Han in China.

Female family headship in the United States has attracted much attention from different disciplines. Competing models of family formation emerge from the economics, sociology, and demography literatures (Becker 1973, 1974a, 1974b; Moffitt and Rendall, 1995; Lichter et al., 1997; Angrist, 2002). A key insight from the literature highlights that male marriageability affects changes in family structure (Cox, 1940; Darity and Myers, 1984 and 1995; Wilson and Neckerman,1986; Raley, 1996; Wilson, 2012; Craigie, Darity and Myers, 2018). Cox (1940) first used the sex ratio as a measure of male marriageability. According to Becker's theory of marriage (Becker, 1973, 1974a, and1981), economic benefits drive many marriages. A woman

will marry if the economic benefits from marriage exceed those gained outside of marriage. Therefore, the economic desirability[7] of males in the marriage market matters more than just the quantity of males. Later, Wilson and Neckerman (1986) confirmed the relationship between employed males and marriage rates. However, Cox (1940) and Wilson and Neckerman (1986) combine both married and unmarried males together in their measures of marriageable males, which does not specifically speak to the current supply of marriageable males.

As an advancement, Darity and Myers (1995) use the ratio of unmarried males in the labor force or in school to unmarried females to measure male marriageability (hereafter D-M ratio). In their study of the racial and ethnic differences in family formation in the United States, they found a strong and consistent inverse relationship between the availability of marriageable Black males and the formation of Black female-headed families. They highlight that a decline in the supply of marriageable males threatens the structure of Black families and increases poverty among female-headed households. Raley (1996) concurs with Darity and Myers (1995). Utilizing the National Survey of Families and Households, Raley provides clear evidence that male

[7] The author acknowledges that economic desirability is an objective word and may be offensive to some people. It only means the economic desirability or ability of men in this easy.

employment characteristics contribute to female marriage rates. Lower employment rates among Black men explain the lower likelihood that Black women will marry or cohabit. However, without specifying the difference across Blacks and whites, Chiappori, Fortin, and Lacroix (2002) and Angrist (2002) empirically conclude that a higher sex ratio increases women's bargaining power in the marriage market. These two studies continue to add evidence about the relationship between marriageable males and female headship.

Recently, Craigie, Myers and Darity (2018) updated estimates of the relationship between rising female family headship and the decline in the supply of marriageable men in the U.S. and accounted for such factors as mass incarceration and sentencing reforms. Unlike the analysis for data from the 1970s and 1980s, the findings for the post-1990s era show racially disparate impacts of male marriageability and female headship. Using the exogenous variation in state-level sentencing reforms as an instrument in estimating male marriageability, the updated analysis again finds a significant inverse relationship between male marriageability and female headship for Blacks, but with a smaller impact of incarceration on family formation.

Empirical studies in the U.S. on the role of male marriageability in explaining female headship offer a useful framework to approach the formation of female-headed households in China. Unlike the United States, where there is a problem of male scarcity, China has a persistent problem of male surplus, as shown in ***figure 2.1***. Therefore, following the language of Becker, the 'quality' [8]of males is more important than the quantity of males since there is a surplus. Quality in the marriage market is defined as the attractiveness of males as good potential husbands, such as employment, which highly correlates with strong economic abilities. Consequently, in this paper, I will adapt and revise the D-M ratio that has previously been used in the USA to the Chinese context to account for the surplus of males. The revised D-M ratio is the ratio of employed unmarried males to unmarried females. In addition, the research on black female headship in the U.S. is particularly relevant in China because Minzu in China, like Blacks in the United States, are marginalized in many respects. They have lower earnings (Gustafsson and Li, 2003; Chen and Hamori 2009; Wu and He, 2016), higher poverty rates and lower educational attainment

[8] The author acknowledges that male quality is an objective word and may be offensive to some people. It only means the economic desirability or ability of men in this easy.

(Gustafsson and Zhong, 2000; Myers et al., 2013) than Han majority group members and face significant discrimination in many markets.

[Insert Figure 2.1 here]

My inquiry into female headship and a Chinese adaptive measure of marriagible males contributes to the broad literature on family structure and inequality. As my measure acknowledges the economic ability of men in the marriage market, it will inform the extent to which female-headed households have formed and changed in China in the post-1980s period and the nature of ethnic differences among such households.

This paper is organized as follows. The second section lays out the conceptual framework and introduces the data sources. Section 2.3 describes the characteristics of female heads and summarizes the D-M ratios. Section 2.4 presents the results and illustrates the link between female headship and the D-M ratio and demonstrates the ethnic difference among the links. Finally, I discuss possible channels and conclude the paper in section 2.5.

2.2 The Conceptual Framework and Data

Men face a potential marriage squeeze when the sex ratio is above one. Specifically, a surplus of men is present when the sex ratio is larger than the upper bound of balanced sex ratios (108:100, by the definition of the World Health Organization). From a marriage perspective, the surplus of men directly affects the probability of marriage because it accounts for the marriage market's population composition (Angrist, 2002 and Edlund, et al., 2013). Since 1982, China has had a sex ratio at birth greater than 110 (UNICEF, 2018). The surplus of men grants the credibility that only include employed men as the numerator of the revised D-M ratio to calculate the marriageability.

Consequently, the D-M ratio for China is the ratio of employed unmarried males between the ages of 20 to 50 to unmarried females between the ages of 20 to 50. The lower bound of age accounts for the minimum legal marriage age. Equation (1) for the index specification is:

$$Revised\ D-M\ Ratio = \frac{\text{unmarried employed males}_{ij}}{\text{unmarried females}_{ij}} \qquad (1)$$

Where i represent the 5-year age interval staring from age of 20, and j denotes Minzu or Han. Conceptually, when the D-M ratio is above 1, it means there are more unmarried employed males than unmarried females by age interval and by Han-Minzu

ethnic identity. Next, I use equation (2) to estimate the association between the female headship and males' marriageability, namely the D-M ratio:

$$Y_{ist} = \delta DM_{st} + \theta Minzu_{ist} + \beta X_{ist} + age_{ist} + \alpha_s + \gamma_t + \varepsilon_{ist} \quad (2)$$

where Y_{ist} is an indicator for female head of household 18 or older *i* residing in province *s* in census year *t.* It equals 1 for a currently unmarried female head of household 18 or older and equals 0 for a married female head over the age of 18. The key independent variable is $\delta\ DM_{st}$, a 5-year age specific ratio. Θ represents the Ethnic Minzu identity. X_{ist} is a vector of characteristics that the literature suggests influence female headship, such as education level, and migration status. age_{ist} represents the age of individual *i* residing in state *s* in census year *t.* α_s and γ_t are state and census year fixed effects, respectively, and ε_{ist} is the conventional error term. The specification is also separate for Han and ethnic Minzu to detect the disparate effect between ethnic Minzu and Han people.

Figure 2.2 illustrates the relationship between the supply of marriageable males and the share of female-headed households. African Americans in the United States and China represent two extremes on the ***figure 2.2***. For African Americans in the United States, the share of female-headed households is high and increases with the declining supply of marriageable males. In contrast, for China, with a D-M ratio

above 1, the share of female-headed households remains low. That is to say, theoretically there should be an inverse relationship between the probability of an unmarried female head of household and the availability of marriageable males. In addition, given the well documented evidence on employment disparities for ethnic Minzu, I would expect there are disparate impacts of male marriageability and female headship among ethnic Minzu than Han, the majority ethnic group.

To examine the above framework in the context of China, the impact of the supply of marriageable males on the formation of female-headed households, I use the one percent China Censuses of 1982, 1990 2000 from IPUMS-International.

[Insert Figure 2.2 here]

2.3 Measures

2.3.1 Female Headship in China

Table 2.1 presents unmarried female headship by census. Among all the female household heads, more than 35 percent are headed by single females aged 18 and older. The overall trend increases slightly from 1982 to 2000. Besides, starting at a higher number, share of unmarried ethnic Minzu female family headships also goes up in the same years. Thus, there is a disparity between Han and ethnic Minzu in

terms of unmarried female headship. To get a better idea of the regional variations for the share of unmarried female headship, ***figure 2.3*** visualizes the share of unmarried female heads by year and by ethnicity.[9] In contrast with the national average, eastern and central regions have a higher share of Han unmarried female headship, and the Han number drives the overall number. Following population density by ethnicity, the western region, an area that traditionally has a larger ethnic Minzu population, has the highest share of ethnic Minzu female heads of household.

[Insert Table 2.1 here]

[Insert Figure 2.3 here]

Taking a closer look at the characteristics of unmarried female heads of household, from the marriage perspective, ***Table 2.2*** presents unmarried female heads under the age of 50. On average, unmarried ethnic Minzu female heads are a little bit older than Han. This relates to the higher percentage of ethnic Minzu female heads in their 30s and 40s, while there is a higher percentage of Han female heads younger than 25 years old. Meanwhile, more than 80 percent of female heads are employed, indicating they have some economic independence and stability. However, combined

[9] The region division is based on the standard from the National Bureau of Statistics of China. The details can be found at:
http://www.stats.gov.cn/ztjc/zthd/sjtjr/dejtjkfr/tjkp/201106/t20110613_71947.htm

with their educational achievement, 80 percent of female heads have only finished primary school or less and may not work in a well-paid occupation. Within the low educational attainment of unmarried female heads, there is a disparity between Han and ethnic Minzu female heads. A higher proportion of ethnic Minzu heads have completed less than primary education level, while higher proportion of Han heads have completed primary and secondary level of education.

[Insert Table 2.2 here]

Meanwhile, about one third of Han female heads have migrated across provinces and display a higher mobility than their ethnic Minzu peers. Though currently unmarried, more than half of the female heads have been previously married, including almost 80 percent of ethnic Minzu who have been married. In addition, Han female heads on average have 1.11 children who live with them, while for ethnic Minzu, the number is more than 1.58, which is consistent with the exemption of the One-child policy.

2.3.2 Revised D-M Ratios from the Censuses

For ease of presentation, I summarize the revised D-M ratios by ethnicity in ***figure 2.4***. In spite of apparent regional variation and differences, uniformly, all regions have a revised D-M ratio greater than one, meaning there are more unmarried and

employed males than unmarried females regardless of ethnic identity. Except for the Northeast, Han always displays a higher revised D-M ratio, however, by the year 2000, the pattern had reversed for Han and ethnic Minzu wherein ethnic Minzu had a higher D-M ratio than Han[10]. Looking at ***figure 2.3*** and ***figure 2.4*** together, we have clear evidence of a negative relationship between the supply of marriageable males and the formation of unmarried female heads because the number of female heads grew in the 1982 to 2000 censuses, while the revised D-M ratios declined in the same years.

[Insert Figure 2.4 here]

2.4. Results

Applying the theoretical framework in ***figure 2.2*** to the one-percent China censuses, ***table 2.3*** reports the ordinary least squares (OLS) estimates between the supply of marriageable males and the share of unmarried female-headed households for females between ages 18 and 50. The first three columns of ***table 2.3*** show the combined results for Han and ethnic Minzu. As expected from the framework, when the revised D-M ratio increases by one unit, it negatively relates to the probability of being an

[10] The province level D-M ratios can be found in the appendix figure 1.

unmarried female head by 1 percentage point. Moreover, compared with Han, ethnic Minzu females are 5 percentage points more likely to be unmarried female heads. With the statistically significant coefficient on ethnic Minzu identity, I examine Han and ethnic Minzu separately to test the disparate impact.

[Insert Table 2.3 here]

Unlike the overall effect, there is no statistically significant effect from the revised D-M ratio on the formation of unmarried Han female headship (column (4) to column (6)), and the coefficient magnitude is minimal. In contrast, for ethnic Minzu (column (7) to column (9)), the statistically significant inverse relationship between the supply of marriageable males and the share of female-headed families is consistent across model specifications. That is to say, there is a disparate ethnic relationship between male marriageability and female headship between ethnic Minzu and Han in China. In addition, the coefficient on the revised D-M ratio for ethnic Minzu only is at least three times larger than the overall association. Therefore, the empirical evidence from the one percent China censuses supports both the reserve relationship between marriageable males and the formation of unmarried female headship and the disparate effect for the ethnic Minzu group.

Addressing the emergent late marriage pattern in China (Qian and Qian, 2014), ***table 2.4*** narrows the sample down to females aged 30 to 50. Derogatory but widely called "leftover women" (Sheng Nü, 剩女), women who remain unmarried in their late twenties and beyond may face more pressure from anxious parents if they live without a husband (Ji, 2015). Therefore, one could expect a stronger association between available men in the marriage market and the likelihood of getting married for older women. However, the estimates from 1982 to 2000 censuses do not support this hypothesis. I find no statistically significant relationship between the revised D-M ratio to the probability of being an unmarried household head for women aged 30 to 50. One possible reason behind the insignificant coefficient of the revised D-M ratio is the cohorts or birth years included in the 1982 to 2000 censuses. The youngest women older than 30 in my sample were born in 1970. The social norms and environment of the 1980s and 1990s were conservative to unmarried females if they were selective in the marriage market. Therefore, there are reasons beyond the supply of males in the marriage market for women being unmarried. Although less likely to happen before the year 2000 and only a few in my sample, we need to recognize that Westernized and independent professional women are different. Their economic independence could afford to defy traditional Chinese norms and remain single and

childless. Consequently, my analysis and the measure of marriageable males may not apply to these women.

[Insert Table 2.4 here]

Similar to late marriage, remarriage may differ from first marriage (Wang and Zhou, 2010). To avoid potential bias from combining never-married female heads with separated, divorced, or widowed female heads, ***table 2.5*** isolates never-married females heads as the interest group. Consistent with the main specifications in ***table 2.3***, once the sample is restricted to never married female heads, men's economic desirability negatively relates to the probability of female headship by about one percentage point. Furthermore, the disparate ethnic Minzu effect continues to never-married females. When controlling for migration status, human capital, age, and province difference, for Han, when the revised D-M ratio increases by one, it decreases the probability of being an unmarried female head by 0.64 percentage points, while the magnitude for ethnic Minzu is 2.23 percentage points.

[Insert Table 2.5 here]

More than a purely individual choice, females face a structural constraint in choosing a husband and being the household head (England and Farkas, 1986; England and McClintock, 2009). Qian and Qian (2014) find that in urban China, there

is an age hypogamy for highly educated females. At the same time, Mu and Xie (2014) indicate that due to economic pressure, there is age hypergamy in China and imply a future 'marriage squeeze for men of low socioeconomic status.' Consequently, I apply different age upper bounds for men and women for the revised D-M ratio to account for the age hypergamy. Specifically, I extend the upper bound for males age to 60 and still use 50 as the female's upper bound in the revised D-M ratio and report the results in ***table 2.6***. There is no statistically significant relationship between age hypergamy in the revised D-M ratio and the formation of unmarried female household heads, regardless of Han or ethnic Minzu.

[Insert Table 2.6 here]

Focusing on migration status, my results suggest that migrants who moved across provinces in the past five years are statistically more likely to be household heads than non-migrants by at least 5 percentage points. Although the censuses do not provide insight into the motivation for migration, the rapid urbanization and economic development of 1980s and 1990s China, moving in search of job opportunities is likely the reason for migration. This finding once again emphasizes the importance of economic stability from a marriage perspective.

In sum, utilizing one percent China censuses, my examination concludes that the supply of marriageable males is inversely related to the formation of female headed households. As expected, ethnic Minzu females experienced a disparate impact of headship from the revised D-M ratio in China. This finding is robust to never married female headship but does not support the age hypergamy theory. And compared to the estimates from the U.S. where there is a surplus of women, my estimation has a stronger effect on ethnic Minzu than results on blacks found in the U.S. data (Craigie, Myers, and Darity, 2018).

2.5. Discussion and Policy Implications

Examining the supply of marriageable males and prevalence of female headship offers some insight into why there is an increase in female headship despite a skewed sex ratio in China. The conventional wisdom of the marriage squeeze for Chinese men stresses the oversupply of males in the marriage market but does not give attention or measure the economic attractiveness of men. Therefore, my revised D-M ratio embraces both the quantity (unmarried) and desirability (employed) of men in the marriage market. Though there is always a high supply of marriageable men in the marriage market, it is also significant that Han-ethnic disparities exist in the

revised D-M ratios. Thus, we can think of the difference in female headship, not claiming a causal effect, as associated with ethnic disparities in the supply of marriageable males. Although the revised D-M ratios are separate for Han and ethnic Minzu and do not exclude people who would be interethnic married, illustrations from 2000 and 2010 Censuses and analyses from essays one demonstrate that the national interethnic married couple share is less the 3 percent. Therefore, I would expect the effect from interethnic marriage to the revised D-M ratios is minimal.

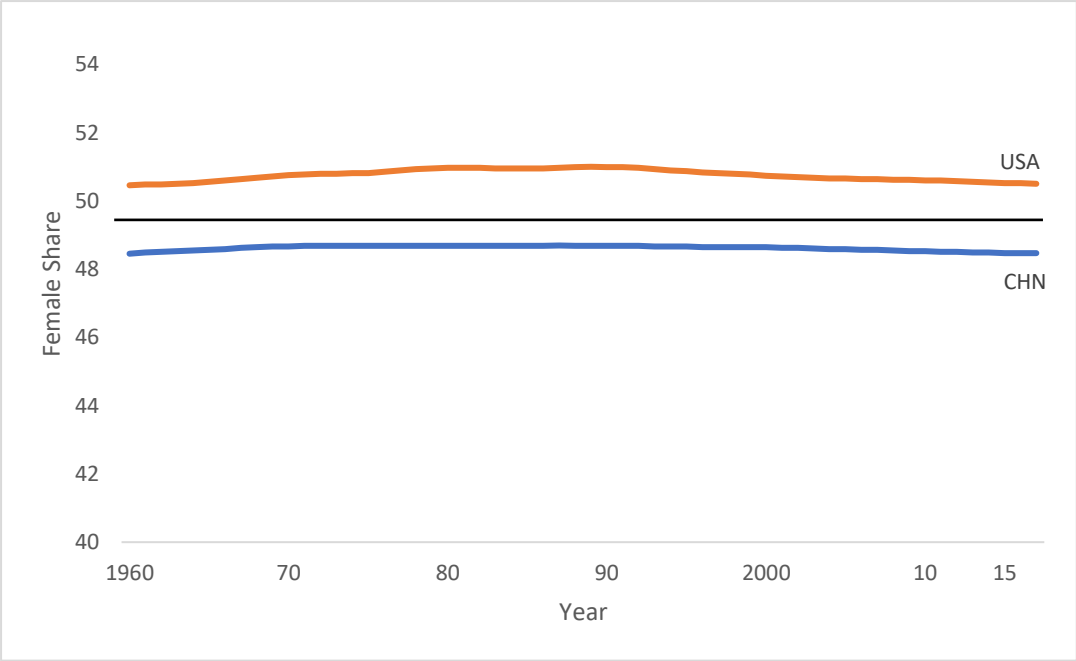
Incorporating the debate about the under count of females in Chinese censuses (Cai and Levely, 2003; Ebenstein, 2010; Bulte, Heerink, and Zhang, 2011), it may also undercount female heads of households. Unable to determine the bias direction from undercounted females, it sheds light on female headship under the two-child policy or even the third-child policy (starting in June 2021) eras. Expecting to have at least one son (Yao and Delgado, 2020; Peng, 2020), parents are selective about the sex of their second child, thus it is not hard to imagine that it will increase the male marriage squeeze. Meanwhile, women obtain the same education as men and can be more selective about their husbands or remaining single with economic independency. Therefore, one implication to reduce the future male marriage squeeze is reduce labor market disparities for ethnic Minzu men.

Inquiring into China's high sex ratio puzzle, one still must confront the evidence of a growing trend of unmarried female headship. My findings suggest the economic ability of unmarried males matters to the growth of unmarried female heads. With different levels of the supply of unmarried and employed males, ethnic Minzu females are differentially affected by the supply of marriageable men, and consequently have a higher probability of being household heads. The descriptive evidence on the lower supply of economic desirability of ethnic Minzu men vs. majority Han is compelling but not formally tested. In future research, I will test the hypothesis that the lower D-M ratios for ethnic Minzu are due to labor market disparities.

My results also have policy implications for family demographers and policymakers who seek to tackle the surplus of men in China. On the one hand, the decades-long, one-child policy produces and increases arranged brides and some bride trafficking from Southeast and South Asia. On the other hand, domestically, China is experiencing an upward trend of female family headship. The connection between the two sides of the puzzle is the economic disadvantage of unmarried or surplus Chinese men. Thus, providing employment opportunities and increasing the availability of jobs are never outdated for a policy agenda. In particular, as suggested by the

literature, ethnic Minzu men face penalties in entering labor markets and during job interviews. Providing policy-induced education opportunities and reducing workplace stereotypes can be practical policy tools. Additionally, reacting strategically to the labor market penalties, already having roots in ethnic Minzu employment, ethnic Minzu entrepreneurship and self-employment are alternative pathways to increasing the economic desirability of surplus men.

Figure 2. 1: Female Share of Population in U.S. and China



Source: https://data.worldbank.org/indicator/SP.POP.TOTL.FE.ZS?locations=CN

https://data.worldbank.org/indicator/SP.POP.TOTL.FE.IN?locations=US

Figure 2. 2: Extreme Sex-Ratios on Female-Headed Households

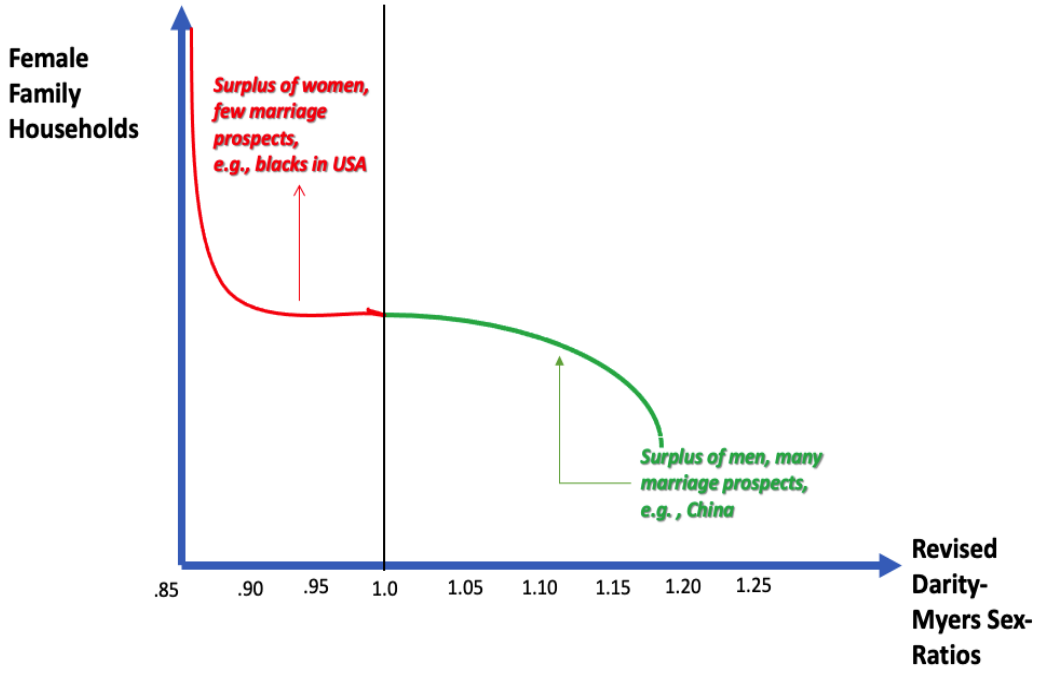
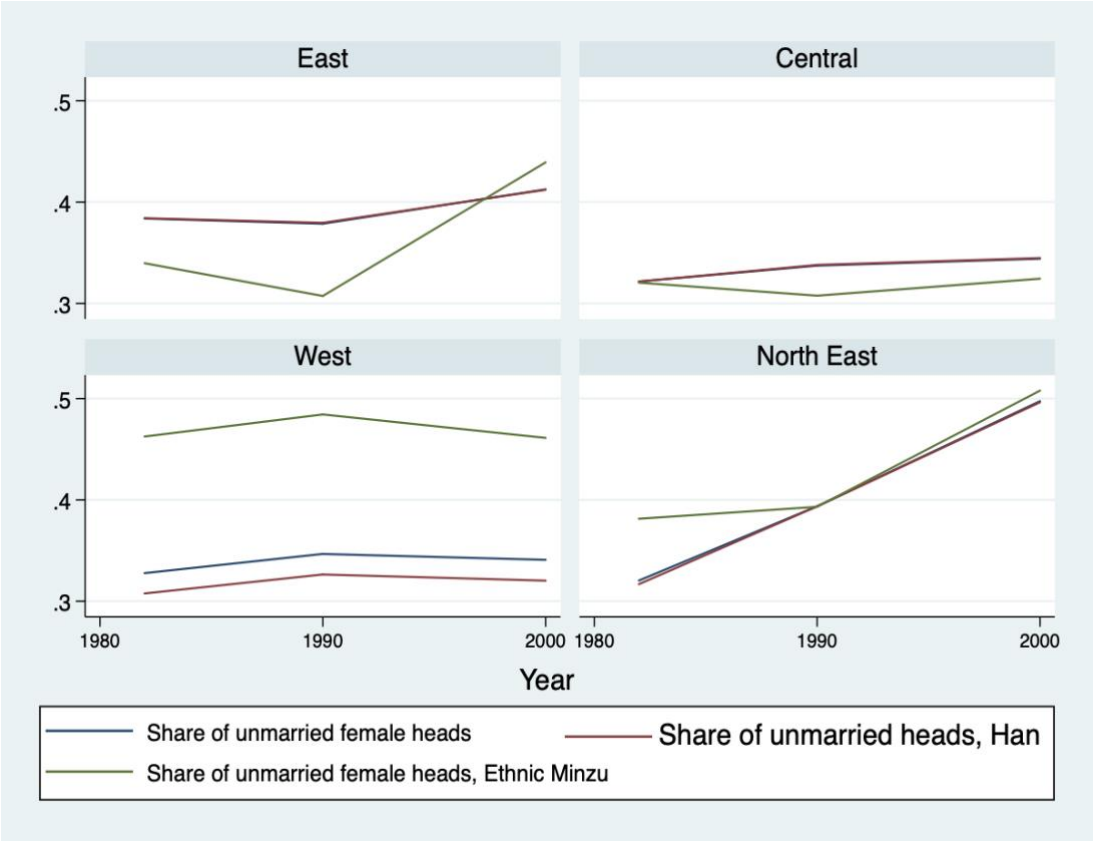
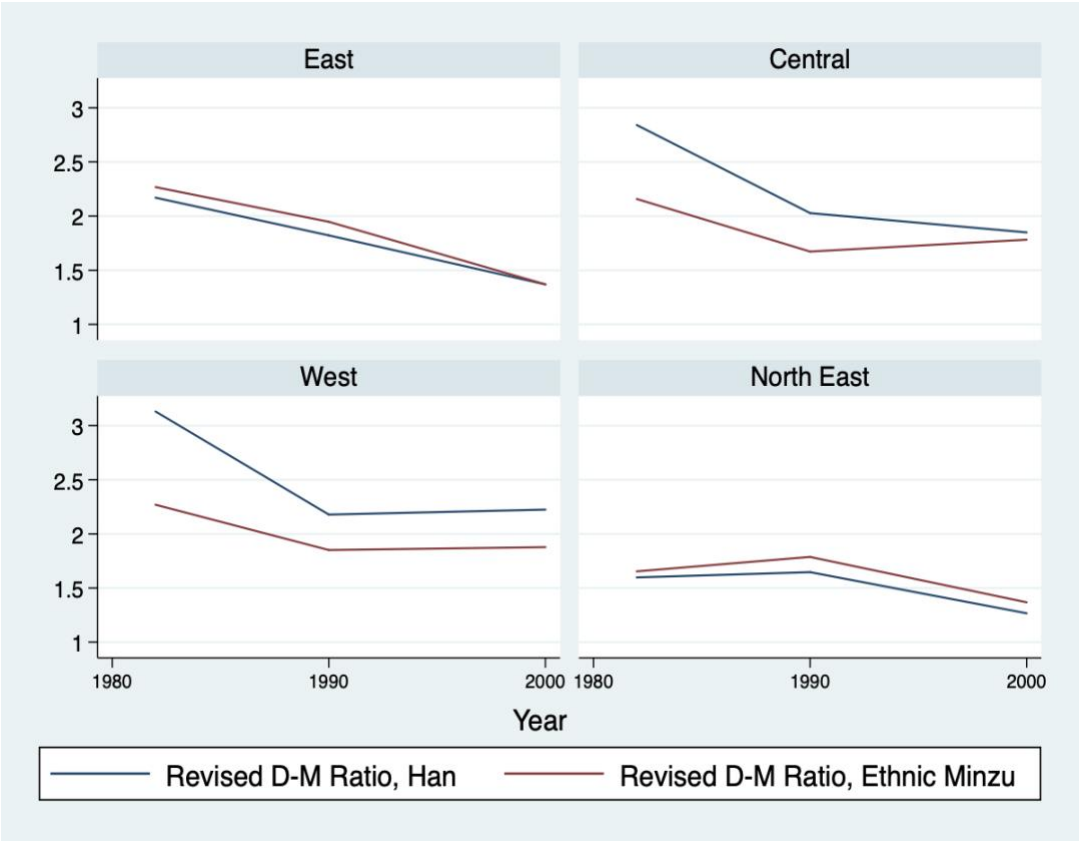


Figure 2. 3: Share of Female Headship by Regions



Source: IPUMS-I 1% China Census, 1982-2000.

Figure 2. 4: Revised D-M Ratio by Region, Same Upper Age Bound for Males and Females



Source: IPUMS-I 1% China Census, 1982-2000.

Note: D-M Ratio equals to unmarried employed males to unmarried females, between ages 20 to 50.

Table 2. 1: Female Headship by Census and Ethnic Minzu Status

	unmarried female headship		Han unmarried female headship		Ethnic Minzu unmarried female headship	
	(N)	share (%)	(N)	share (%)	(N)	share (%)
1982	126,786	34.77	119,244	34.35	7,194	43.32
1990	141,501	35.82	131,832	35.37	9,226	44.05
2000	182,641	37.77	168,798	37.31	13,098	44.41
Average	150,309	36.12	139,958	35.68	9,839	43.93

Source: IPUMS-I 1% China Census, 1982-2000.

Table 2. 2: Characteristics of Unmarried Female Headship by Census and Ethnic Minzu Status

	Han, under age of 50			Ethnic Minzu, under age of 50			Difference between Han and Ethnic Minzu
	Mean	St. Dev.	N	Mean	St. Dev.	N	%
Age:	34.15	11.18	118,421	36.18	10.41	11,725	-5.94
18 <=age<24	0.32	0.47	118,421	0.22	0.41	11,725	31.25
25 <=age<30	0.09	0.28	118,421	0.09	0.29	11,725	0.00
30 <=age<40	0.18	0.39	118,421	0.22	0.42	11,725	-22.22
40<=age<50	0.36	0.48	118,421	0.4	0.49	11,725	-11.11
Education:							
Less than primary completed	0.22	0.42	118,421	0.38	0.49	11,725	-72.73
Primary completed	0.51	0.5	118,421	0.41	0.49	11,725	19.61
Secondary completed	0.25	0.43	118,421	0.2	0.4	11,725	20.00
University completed	0.02	0.14	118,421	0.01	0.12	11,725	50.00
Employed	0.81	0.39	118,421	0.86	0.34	11,725	-6.17
Migrated across province 5 years ago (Only for year of 1990 and 2000)	0.33	0.47	93,879	0.23	0.42	9,245	30.30
Married before	0.59	0.49	118,421	0.7	0.46	11,725	-18.64
Number of own children in the household	1.11	1.41	118,421	1.58	1.65	11,725	-42.34
Rural, only for year of 2000	0.47	0.5	66,414	0.68	0.46	6,208	-44.68

Source: IPUMS-I 1% China Census, 1982-2000.

Table 2. 3: OLS Estimates between the Revised D-M Ratios and Unmarried Female Headship

	All			Han			Ethnic Minzu		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		All			Han			Ethnic Minzu	
Ethnic Minzu	0.0535***	0.0544**	0.0567***						
	(0.0191)	(0.0196)	(0.0198)						
County level revised D-M Ratios	-0.0124*	-0.0096*	-0.0074*	-0.0073	-0.0121	-0.0093	-0.0426**	-0.0393*	-0.0362*
	(0.0066)	(0.0053)	(0.0041)	(0.0079)	(0.0097)	(0.0070)	(0.0198)	(0.0203)	(0.0180)
Employed		0.0093**	0.0050		0.0082	0.0025		0.0292**	0.0282**
		(0.0044)	(0.0036)		(0.0068)	(0.0056)		(0.0120)	(0.0110)
Migrated across province 5 years ago		0.0940***	0.0537***		0.0834***	0.0426***		0.1136***	0.0615***
		(0.0101)	(0.0065)		(0.0081)	(0.0065)		(0.0132)	(0.0108)
Has at least one child in family			-0.1973***			-0.1958***			-0.2666***
			(0.0124)			(0.0116)			(0.0129)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.0074***	0.9483***	0.9997***	0.9999***	0.9417***	0.9924***	0.9965***	0.9214***	0.9910***
	(0.0132)	(0.0168)	(0.0114)	(0.0110)	(0.0147)	(0.0109)	(0.0654)	(0.0696)	(0.0669)
Observations	747,011	747,011	747,011	704,944	704,944	704,944	42,067	42,067	42,067
R squared overall	0.221	0.226	0.252	0.230	0.255	0.270	0.154	0.157	0.194

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: IPUMS-I 1% China Census, 1982-2000.

Note: Table 2.3 includes females between ages 18 to 50.

Table 2. 4: OLS Estimates between the Revised D-M Ratios and Unmarried Older Female Headship

	All			Han			Ethnic Minzu		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ethnic Minzu	0.0697***	0.0697***	0.0706***						
	(0.0230)	(0.0230)	(0.0231)						
County level revised D-M Ratios	-0.0024	-0.0024	-0.0022	0.0035	0.0036	0.0037	-0.0344	-0.0352	-0.0345
	(0.0032)	(0.0032)	(0.0031)	(0.0045)	(0.0045)	(0.0046)	(0.0214)	(0.0213)	(0.0209)
Employed		0.0016	0.0011		0.0002	-0.0004		0.0285**	0.0301**
		(0.0031)	(0.0031)		(0.0033)	(0.0032)		(0.0122)	(0.0116)
Migrated across province 5 years ago		0.0025	-0.0101		0.0051	-0.0072		-0.0187	-0.0364*
		(0.0060)	(0.0068)		(0.0057)	(0.0065)		(0.0176)	(0.0182)
Has at least one child in family			-0.0751***			-0.0732***			-0.1175***
			(0.0076)			(0.0074)			(0.0117)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.1223***	0.1207***	0.1954***	0.1045***	0.1040***	0.1774***	0.2833***	0.2590***	0.3685***
	(0.0104)	(0.0105)	(0.0101)	(0.0117)	(0.0115)	(0.0133)	(0.0562)	(0.0522)	(0.0504)
Observations	542,149	542,149	542,149	512,385	512,385	512,385	29,764	29,764	29,764
R squared overall	0.0591	0.0591	0.0630	0.0511	0.0511	0.0549	0.0856	0.0848	0.0914

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: IPUMS-I 1% China Census, 1982-2000.

Note: Table 2.4 includes females between ages 30 to 50.

Table 2. 5: OLS Estimates between the Revised D-M Ratios and Never Married Female Headship

	All			Han			Ethnic Minzu		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ethnic Minzu	0.0044	0.0054	0.0072*						
	(0.0042)	(0.0040)	(0.0038)						
County level revised D-M Ratios	-0.0134*	-0.0098*	-0.0075**	-0.0121	-0.0086	-0.0064*	-0.0326***	-0.0277**	-0.0223**
	(0.0068)	(0.0049)	(0.0031)	(0.0073)	(0.0053)	(0.0035)	(0.0115)	(0.0117)	(0.0083)
Employed		0.0079**	0.0020		0.0079**	0.0022		0.0019	-0.0046
		(0.0038)	(0.0026)		(0.0037)	(0.0025)		(0.0069)	(0.0055)
Migrated across province 5 years ago		0.1163***	0.0739***		0.1144***	0.0735***		0.1364***	0.0745***
		(0.0115)	(0.0048)		(0.0118)	(0.0052)		(0.0139)	(0.0096)
Has at least one child in family			-0.2030***			-0.1966***			-0.3146***
			(0.0161)			(0.0165)			(0.0165)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.9636***	0.8936***	0.9469***	0.9650***	0.8957***	0.9472***	0.9202***	0.8508***	0.9366***
	(0.0079)	(0.0157)	(0.0067)	(0.0075)	(0.0151)	(0.0072)	(0.0261)	(0.0319)	(0.0213)
Observations	668,402	668,402	668,402	634,566	634,566	634,566	33,836	33,836	33,836
R squared overall	0.565	0.579	0.633	0.572	0.586	0.637	0.465	0.483	0.586

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: IPUMS-I 1% China Census, 1982-2000.

Note: Table 2.5 includes never married females between ages 18 to 50.

Table 2. 6: OLS Estimates between the Age Hypogamy Revised D-M Ratios and Unmarried Female Headship

	All			Han			Ethnic Minzu		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ethnic Minzu	0.0542***	0.0549**	0.0572***						
	(0.0193)	(0.0198)	(0.0199)						
County level revised D-M Ratios	-0.0073	-0.0051	-0.0032	-0.0046	-0.0025	-0.0007	-0.0227	-0.0204	-0.0185
	(0.0060)	(0.0049)	(0.0039)	(0.0071)	(0.0059)	(0.0050)	(0.0152)	(0.0155)	(0.0137)
Employed		0.0093**	0.0050		0.0080*	0.0037		0.0291**	0.0281**
		(0.0044)	(0.0036)		(0.0045)	(0.0037)		(0.0122)	(0.0112)
Migrated across province 5 years ago		0.0943***	0.0541***		0.0937***	0.0544***		0.1157***	0.0633***
		(0.0102)	(0.0065)		(0.0103)	(0.0069)		(0.0127)	(0.0104)
Has at least one child in family			-0.1974***			-0.1935***			-0.2672***
			(0.0124)			(0.0125)			(0.0126)
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.9982***	0.9397***	0.9911***	0.9952***	0.9378***	0.9883***	0.9706***	0.8951***	0.9664***
	(0.0136)	(0.0168)	(0.0121)	(0.0118)	(0.0152)	(0.0114)	(0.0701)	(0.0738)	(0.0712)
Observations	747,010	747,010	747,010	704,944	704,944	704,944	42,066	42,066	42,066
R squared overall	0.221	0.225	0.251	0.225	0.230	0.255	0.150	0.153	0.191

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Source: IPUMS-I 1% China Census, 1982-2000.

Note: Table 2.6 includes females between ages 18 to 50.

Essay Three: Anti-Miscegenation Laws, Chinese Exclusion Acts and Interracial Marriage among Chinese Americans between 1880 and 1940

3.1 Introduction

This essay examines the impact of the passage of Asian/Chinese anti-Miscegenation laws on the interracial marriage outcomes for Chinese Americans from 1880 to 1940. Not a familiar term for most people, miscegenation means a marriage of people from two races (Browning, 1951). In the U.S. context, anti-miscegenation laws denote laws that prohibit and criminalize interracial marriage, largely forbidding marriage between whites and non-whites. Rooted in the persistent idea of racial purity, whites colonialists in Maryland and Virginia first enacted anti-miscegenation laws to preserve "racial integrity" and privileges. Effective for more than two hundred years in the U.S., anti-miscegenation laws deny basic civil rights and freedom of choice to marry (*Loving v. Virginia*, 1967). In addition, the enduring discrimination and stereotypes produced under the system profoundly shape public opinion of racial and ethnic groups. Brought to the U.S. for economic development, Chinese laborers had a long history of marginalization and were undesirable in U.S. society. However, the degree to which anti-miscegenation laws have inhibited Chinese marriages has rarely been examined. This essay focusses on the impact of the enactment of Chinese anti-miscegenation laws and interracial marriages of Chinese citizens in 1880-1940.

A landmark decision of the U.S. Supreme Court, Loving v. Virginia, 388 U.S. 1 (1967) struck down all state laws banning interracial marriage (Pascoe, 2009) as "violations of the Equal Protection and Due Process Clauses of the Fourteenth Amendment to the U.S. Constitution" (Nowak & Rotunda, 2012). Not every state had an anti-miscegenation law, and the majority of states had already legalized interracial marriage prior to the Loving decision (Menchaca, 2008), which produced various outcomes and trends in marriage for Chinese immigrants and Chinese American citizens. A relatively large body of research has broadly examined trends and outcomes in interracial marriage since the 1970s (Qian, 1997; Fu, 2001; Qian & Lichter, 2007), and many qualitative designs (Hsu, 2000; Lee, 2003) provide a rich and nuanced understanding of the experiences of Chinese Americans but are less generalizable. Nevertheless, little quantitative research has directly examined the historical effects or outcomes of anti-miscegenation laws in different states and their impact on interracial marriage for Chinese people, based on the years when the laws were in effect.

Existing research on the effects or outcomes of anti-miscegenation laws on interracial marriage has yielded mixed findings. Digging into the texts of the historical anti-miscegenation legislation, Sohoni (2007) showed that states used anti-

miscegenation laws to restrict the marriage rights of U.S.-born Chinese and other Asians by linking them with their foreign-born co-ethnics. These laws justified the differential treatment of Chinese and other racial and ethnic immigrant groups. Using historical marriage licenses, Lo and Ng (2013) documented 76 Chinese-white marriages from 1886 to 1930 in Massachusetts, where the state anti-miscegenation law was abolished in 1843. They concluded that the Chinese American community in Massachusetts in the early to mid-20th century included many mixed marriages and families, and actually developed from a more heterogeneous community to a more homogeneous one after the abolishment of state anti-miscegenation law. When Chinese citizens are grouped with other Asians, drawing a 1% sample from the Integrated Public Use Microdata Series (IPUMS) rather than monotonically increasing over time, one finds that the share of Asians intermarrying outside their ethnic group remains below 5% from 1880 to1940. After adjusting for relative supply and population share, Fryer (2007) concluded that the proclivity of Asians to marry outside their ethnicity increased significantly in the 20th century. But, this widely cited work ignores the causal impacts of twin historical components of marriages among Chinese in America: The Chinese exclusion laws, affecting the supply of Chinese women; and Chinese Anti-Miscegenation laws.

Conventional wisdom also suggests that higher educational attainment increases the probability of marrying outside one's racial group. Studies show that compared to people with low educational attainment, people with high attainment have a higher likelihood of marrying partners of different races or religions (Qian, 1997; Kalmijn,1993 and 1998; Gullickson, 2006). Qian, Blair, and Ruf (2001) analyzed Asian-American interracial and interethnic marriage patterns from an education and country of origin perspective. Given the strong endogamy marriage preference among Asian Americans, only those who achieved socioeconomic success had a higher probability of intermarrying. However, achieving socioeconomic success does not guarantee a stable marital relationship. Bratter and King (2008) compared marriage cohorts and revealed that overall, interracial couples have a higher rate of divorce than same-race couples, particularly those marrying during the late 1980s.[11] Later, using the Survey of Income and Program Participation (SIPP), Zhang and Hook (2009) found a similar, less stable pattern for interracial marriages. With regard to wages, using a 5% sample of the 2000 U.S. Census, Basu (2015) found a more

[11] Bratter and King's (2008) study shows that along with some couple combinations by race and gender, white female/Asian male marriages were more likely to end in divorce.

negative wage premium for interracially married Asian women than for non-interracially married Asian women.

In addition, the study of the effects of anti-miscegenation laws on Chinese American intermarriages is complicated by the history of Chinese discrimination. The Page Act of 1875 started a series of Chinese Exclusion Acts that discriminated against all Chinese immigrants. The prevalent view of Chinese as "unassimilable" helped condone racial discrimination against Chinese citizens and added layers to the adversity they and their descendants faced in the U.S. (Chin, 1996). Although the Chinese Exclusion Act was repealed in 1943 (57 Stat. 600), as Erika Lee (2005) describes, it produced and reinforced a system of racial hierarchies, including immigrants and residents who were supposed to be exempt from the exclusionary laws. Moreover, the racial hierarchies produced economic inequality between Chinese Americans who married whites and those who married blacks

This paper examines the impact of Chinese Anti-Miscegenation laws passed from the late 19th century to mid-20th century on the interracial married status of Chinese citizens in the U.S. My study improves on those of Fryer (2007) in several ways. First, rather than using a one percent sample, I employ individual-level full-count censuses data from 1880 to 1940, including more than two hundred thousand

Chinese people aged above 20. Second, attempting to isolate the causal effect, I rely on the time variation in the state laws that prohibited Chinese intermarriage with whites and apply difference-in-difference (DID) methods. At the same time, I adequately address and use the clustered standard to study state-level policy changes when using individual-level data. Further, instead of taking the state enacted Chinese anti-miscegenation laws exogenously, I also use an instrumental variable strategy as one of the robustness checks.

Contradicting the expectation that the passage of Chinese anti-miscegenation laws should decrease or eliminate Chinese interracial marriages, my results indicate that enactment of such laws had no significant effect on Chinese intermarried status. Moreover, unlike literature on black-white marriages, illustrating that they remained low after the repeal of anti-miscegenation laws (Porterfield, 1982; Johnson and Kreider, 2013; Rico et al., 2018), Chinese interracial marriages increased at high incidence once legitimized in the late 20th and 21st century. Thus, studying the historical laws shows how the increase of Asian-white interracial marriages emerged against a backdrop of prohibition of such marriages in the 19th century and the first half of the 20th century.

In the following sections, Section 2 provides a brief historical background of anti-miscegenation laws and the Chinese Exclusion Acts. Section 3 describes data and methods. Section 4 provides empirical results and specification tests, and Section 5 concludes the paper with possible explanations for the findings as well as future extensions of this research.

3.2 Historical Context

3.2.1 Anti-Miscegenation Laws and Chinese Anti-Miscegenation Laws

While there were no federal anti-miscegenation laws in the United States, individual state laws, particularly in Southern states and Plains states, proscribed inter-racial marriage (American Civil Liberties Union).***Figure 3.1*** illustrates which states had anti-miscegenation laws. Only ten states never enacted anti-miscegenation laws: Alaska, Connecticut, Hawaii, Minnesota, New Hampshire, New Jersey, New York, Vermont, and Wisconsin. Eleven states passed anti-miscegenation laws but repealed them prior to 1887: Pennsylvania (1780), Massachusetts (1843), Iowa (1851), Kansas (1859), New Mexico (1866), Washington (1868), Illinois (1874), Rhode Island (1881), Maine (1883), Michigan (1883), and Ohio (1887). Kansas, New Mexico, and

Washington repealed their laws before achieving statehood.[12] Fourteen more states rescinded their anti-miscegenation statutes between 1887 and 1967: California (1948), Oregon (1951), Montana (1953), North Dakota (1955), Colorado (1957), South Dakota (1957), Idaho (1959), Nevada (1959), Arizona (1962), Nebraska (1963), Utah (1963), Indiana (1965), Wyoming (1965), and Maryland (1967).

[insert figure 3.1 here]

The U.S. Supreme Court's decision in *Loving v. Virginia (1967)* made anti-miscegenation laws unconstitutional nationwide. At the time, sixteen states still had such statutes in effect, and it was not until 2000 that all sixteen states formally repealed their anti-miscegenation laws, despite not being enforceable or valid since 1967. Six states legalized interracial marriage right after *Loving v. Virginia:* Virginia (1968), Florida (1969), Missouri (1969), Oklahoma (1969), Texas (1969), and West Virginia (1969). The remaining ten states amended their state constitutions to legalize interracial marriage: Georgia (1972), Louisiana (1972), Arkansas (1973), North Carolina (1972), Kentucky (1974), Tennessee (1978), Delaware (1986), Mississippi (1987), South Carolina (1998), and Alabama (2000). The last state to legalize interracial marriage was Alabama, when voters approved the Alabama Interracial

[12] Kansas gained its statehood in 1861, Washington in 1889, and New Mexico in 1912.

Marriage Amendment (also known as 2000 Alabama Amendment 2) with 59.49% (Alabama.gov, 2000) of the vote.

While every anti-miscegenation law prohibited interracial marriage between blacks and whites, not every law clarified whether interracial marriage with Chinese was unlawful. For the statutes that banned marriage with Chinese, the specific language in these statutes that referred to Chinese people varied from state to state. ***Table 3.1*** lists the year each state enacted its first Chinese anti-miscegenation law and summarizes all the statutes that prohibited Chinese from marrying whites. ***Figure 3.2*** then illustrates all of the states that passed a Chinese anti-miscegenation law. Fifteen out of 41 states with anti-miscegenation laws prohibited Chinese or some subgroups of Asians from marrying whites; fourteen[13] out of fifteen included Chinese in their intermarriage legislation.[14]

[insert Table 3.1 here]

[insert Figure 3.2 here]

[13] The statutes of Arizona, California, Mississippi, Missouri, South Dakota, Utah, and Wyoming all referred to "Mongolians." Idaho, Nevada, and Oregon first used “Chinese,” and later broadened theirs laws to “Mongolians." Virginia used the terms “colored” person or “people of color.” Montana and Nebraska specified both "Chinese" and "Japanese" persons.

[14] Maryland only banned intermarriage with Malays.

Even before it was admitted to the United States in 1864, Nevada enacted Asian anti-miscegenation laws in 1861. The "An Act to Prohibit Marriages and Cohabitation of Whites with Indians, Chinese, Mulattoes and Negroes, Assembly of the Territory of Nevada, 1861" marked the first American jurisdiction to specifically prohibit marriage between whites and Chinese. The Act states that

> If any white man or woman intermarry with any black person, mulatto, Indian, or Chinese, the parties to such marriage shall be deemed guilty of a misdemeanor, and, on conviction thereof, be imprisoned in the territorial prison for a term not less than one year, nor more than two years.

In 1864, the same year Nevada was admitted to the Union, the Idaho Territory prohibited intermarriage between whites and Indians,[15] Chinese, and persons of African descent (Idaho Terr. Gen. Laws 1864). However, in 1887, it added a provision to its statutes recognizing interracial marriages performed in other territories, stipulating that "All marriages contracted without this Territory, which would be valid by the laws of the country in which the same were contracted, in this Territory." In addition, Martin (1980) reported that the Idaho legislature relaxed the

[15] Indian in this context denotes American Indian.

prohibition on intermarriage between whites and Mongolians. The state statute approved whites to marry Mongolians from 1887 to 1921.[16]

A couple of months later in 1865, the Arizona Territory became the first American jurisdiction to pass an anti-miscegenation law that banned interracial marriage between whites and "Mongolians," 25 years earlier than California. While California became the first western state to pass an anti-miscegenation law in 1850, it was not until 1880 that California prohibited whites from marrying Mongolians. The Amendments of Codes of California 1880 states that the issuance of marriage licenses to Caucasian and Chinese couples was prohibited. Later, the 1905 California Statues 554 declared that "Mongolian" marriage with a white was void. Although the term "Mongolians" occasionally generated controversy over who was to be included in this group, marriage clerks and judges often interpreted "Mongolians" as encompassing both "Chinese" and "Japanese" (Kwon, 2011; Martin, 1980). It was not until the 1920s that county clerks began to encounter marriage license applications for marriages between Filipinos and whites. Though the California courts forced the issuance of marriage licenses to some Filipino and white couples, in 1933, the statute

[16] Beginning in 1887, the Revised Statutes eliminated Indians and Chinese from the taboo categories.

was amended once again to include “members of the Malay race” (which included Filipinos) as part of those ineligible to marry whites (Volpp, 1999; Cal. Stat. 1933).

Unlike the western states, the racial implication of Mississippi’s first anti-miscegenation law (1822 Mississippi Code ch.102, sec.1) was unclear. It only indicates that marriages between whites are legally valid. Nevertheless, in 1865 after the Civil War ended, Mississippi passed the most severe penalty for intermarriage in American history, specifically, life imprisonment in the state penitentiary:

> …That it shall not be lawful for any freedman, free negro or mulatto to intermarry with any white person; nor for any white person to intermarry with any freedman, free negro or mulatto; and any person who shall so intermarry shall be deemed guilty of felony, and on conviction thereof, shall be confined in the State Penitentiary for life; ...

Although the law was suspended during Reconstruction, it was reinstated in 1880. Then, in the Code of 1892, Mississippi broadened the ban on whites intermarrying to include Mongolians.

Montana passed its first anti-miscegenation law in 1909, much later than other states, to reinforce the taboo. Like other western states, the law primarily targeted marriages between whites and Chinese and Japanese. Of course, the law could not

omit the one-drop rule to ban white-black marriages. In the same year, South Dakota passed its first anti-miscegenation law. Different from Montana, South Dakota's first law was enacted without mentioning Chinese. Later, in 1913, South Dakota repealed the 1909 statutes and put restrictions on marriages between whites and Chinese.

In summary, forbidding whites to marry Chinese was never the central point of American anti-miscegenation laws, but after the Civil War and with the growth in Chinese immigrants, in the mid-19th century, almost one-third of the states placed Chinese into an excluded group. Four states (Arizona, Idaho, Nevada, and Utah) passed Chinese anti-miscegenation statutes even before statehood. Since the laws were enacted in different states and in different years, these laws would affect interracial marriage rates for Chinese people across states and years. This interstate and intertemporal variability in the years Chinese anti-miscegenation laws were enacted allows for the performance of multi-period, differences-in-differences analyses on the marriage outcomes for Chinese people.

3.2.2 The Page Act of 1875

Introduced and sponsored by Horace F. Page, a California Republican congressman, *the Page Act of 1875* (18 Stat. 477) was the first federal law to restrict immigration in the United States. It closed the borders to Chinese women entering the United States

(Abrams, 2005). The Page Act has two main elements: (1) it banned entry for any involuntary labor into the United States from China, Japan, or any Asian country, and (2) it placed a harsher ban on Chinese women. The act forbids contracts, agreements, and importation of women for prostitution:

> "… shall knowingly or willfully hold, or attempt to hold, any woman to such purposes, in pursuance of such illegal importation and contract or agreement, shall be deemed guilty of a felony, and, on conviction thereof, shall be imprisoned not exceeding five years and pay a fine not exceeding five thousand dollars".

Even though the Page Act aimed to exclude Chinese women who would engage in prostitution, it virtually barred and excluded all Chinese women from the United States during its implementation (Luibhéid, 2002) and considered Chinese women undesirable (Abrams, 2005). Therefore, Chinese immigrants were unable to create families with each other or across races and ethnic groups within the United States due to the formidable barriers. According to Peffer (1986) "… before they set foot on a China steamer, [the Page Act] must have helped to discourage them from ever attempting the journey and, in so doing, contributed to the process that made Chinese families forbidden institutions in a land that did not want them…", which had a far-

reaching influence on Chinese marriages even in states without anti-miscegenation laws and created massive numbers of Chinese bachelors who worked in the U.S. but had wives in China (Hsu, 2000).

3.2.3 Chinese Exclusion Acts: The Chinese Exclusion Act of 1882, The Geary Act of 1892, and The Immigration Act of 1924

As the first immigration law to exclude an entire ethnic group (Lee, 2003), the *Chinese Exclusion Act of 1882 (*22 U.S. Stat. 60) started a series of laws passed in the United States to discriminate against Chinese immigrants, including but not limited to the Geary Act (27 Stat. 25), the Immigration Act of 1917 (39 Stat. 874), and the Immigration Act of 1924 (43 Stat. 153). The *Chinese Exclusion Act (1882*) banned both "skilled and unskilled laborers and Chinese employed in mining." Later, the Geary Act (1892) required "Chinese already in the U.S. to possess 'certificates of residence' that served as proof that they entered the U.S. legally and had the right to remain in the country (Salyer, 1995)." Therefore, very few Chinese immigrants could enter the country after 1882.[17] Even Supreme Court Justice John Marshall Harlan, a judge well known for his dissent in *Plessy v. Ferguson*, 163 U.S. 537 (1896), wrote:

[17] Diplomatic officials and other officers on business, along with their house servants, for the Chinese government were allowed entry as long as they had the proper certification verifying their credentials. Merchants, teachers, travelers, and students were exempted as well.

> "[t]here is a race [Chinese] so different from our own that we do not permit those belonging to it to become citizens of the United States. Persons belonging to it are, with few exceptions, absolutely **excluded** from our country. I allude to the Chinese race. But, by the statute in question, a Chinaman can ride in the same passenger coach with white citizens of the United States, while citizens of the black race in Louisiana, many of whom, perhaps, risked their lives for the preservation of the Union... and who have all the legal rights that belong to white citizens, are yet declared to be criminals, liable to imprisonment, if they ride in a public coach occupied by citizens of the white race."

Measuring the impacts of the passages of past laws econometrically is challenged by the small population of Chinese in the U.S., the fragmentary nature of marriage records, and the measurement of law outcomes. Luckily, the interstate and intertemporal variability of enactment of anti-miscegenation laws, the release of full counts of historical U.S. censuses, and linked spouse race in the census record offer some particular advantages in modeling and estimation of the policy impacts. The following section documents the details about the data and method used in this essay.

3.3 Data and Method

My analyses are based on complete-count microdata from the 1880-1940 U.S. Censuses from the Integrated Public Use Microdata Series (IPUMS) (hereafter, 1880-1940 U.S. data). ***Figure 3.3*** shows the proportion of the Chinese population 20 and over that was subject to Asian anti-miscegenation laws in all of the census years. In 1880, 53.87% of the Chinese population lived in states that had enacted Asian anti-miscegenation laws. The peak came in the 1920 census. Over half (60.23%) of the Chinese population lived in the states where they could not marry whites. By 1960, according to the last census before the *Loving vs. Virginia* case, 58.3% of Chinese were still subject to Asian anti-miscegenation laws. Starting with the 1880 census,[18] a question on marital status was included and IPUMS adds an additional marital status category for "married, spouse absent," which helped construct my analytical sample.

[insert figure 3.3 here]

Appending 1880-1940 U.S. data and the dates when Chinese anti-miscegenation laws were enacted, I constructed repeated cross-sectional data of Chinese and their

[18] J. David Hacker (1999) and Catherine A. Fitch (2005) used the surname, sex, age, and position in a household to create a "never married" variable for the 1850-1870 censuses. Given the small Chinese population prior to the1870 census, I did not construct the "never married" variable myself and focus instead on the 1880 and later censuses.

spouses. My primary dependent variable is an indicator of inter-racial married status, and the sample is restricted to adults at age of 20 and above. One non-trivial issue for Chinese in the historical census is that a large proportion of them were married but with a spouse not present in the household. This did not negatively affect my analysis of inter-racial married status, but I assumed that the individuals with an absent spouse were *intramarried* with a Chinese spouse for the intermarriage rate analysis.[19] In addition, Hawaii and Alaska are excluded from the sample because even though there is a long history of Chinese and Chinese enclaves in Hawaii, Hawaii and Alaska achieved statehood much later than the main years of Chinese exclusion (1975-1943) and the years when anti-miscegenation laws (1691-1968) were most vigorously enacted and enforced. Therefore, every other state in the sample was a part of the Union from 1880 to 1940.

I also include age, U.S.-born, ability to read and write, occupation, and a skewed sex ratio indicator if the county-level male-to-female sex ratio is greater than 5.[20] To account for Chinese habitation within cities and ethnic enclaves, in particular, I

[19] There were 138,219 spouses absent in the household.

[20] The conventional skew sex ratio in the literature is 1.06 or 1.08. Given the context that early Chinese immigrants to the U.S. were predominantly male laborers, I use 10 as the threshold of the unbalanced sex ratios.

generated an indicator for Chinatown based on the historical records. Assembling information from different states' historical societies, urban renewal projects websites, and Chinatown association websites, ***Table 3.2*** presents a list of the historical U.S. Chinatowns. The very first Chinatowns formed during the gold rush years, followed by Chinatowns built in cities along Central Pacific and Union Pacific railroads (Kennedy et al., 2020). Unfortunately, most of these early Chinatowns have vanished except for those in big cities. Due both to riots against Chinese communities and the Chinese Exclusion Acts, Chinese residents were pushed out of California and migrated to northern and central states where they were offered jobs or safety (Li, 2018; Pfaelzer, 2008). The growth, expansion, and decline of Chinatowns offers a unique variability that allows this analysis to reveal unobserved heterogeneity across states capturing the anti-Chinese sentiment.

[insert Table 3.2 here]

To investigate the effect of Asian/Chinese anti-miscegenation laws on interracial marital status, I employed the standard difference-in-difference (DID) strategy that compares the inter-racial marital status of individuals who resided in states that had Chinese anti-miscegenation laws to that of individuals who lived in states that did not enact Chinese anti-miscegenation laws. The average sex ratio

across 1880-1940 censuses for Chinese is 10.26. Given the extremely unbalanced sex ratio among the Chinese in the United States prior to 1940, I performed the analysis separately for men and women. My main specification is:

$$Y_{ist} = \delta\ antiCHNmar_{st} + \beta X_{ist} + age_{ist} + \alpha_s + \gamma_t + \varepsilon_{ist} \qquad (1)$$

where Y_{ist} is an indicator for individual *i* residing in state *s* and intermarried in census year *t.* My independent variable of interest is $\delta\ antiCHNmar_{st}$, an indicator to 1 if state *s* implemented an Asian/Chinese anti-miscegenation law in census year *t.* It estimates the effect of Asian/Chinese anti-miscegenation laws on the probability that a Chinese individual would be inter-married in state *s* at census year *t.* X_{ist} is a vector of characteristics that are suggested to influence the inter-married status discussed in the previous paragraphs. age_{ist} represents the age of individual *i* residing in state *s* in census year *t*. α_s and γ_t are state and census year fixed effects, respectively, and ε_{ist} is the conventional error term.

Given the debate about the best way to correct serial correlation in DID models (Angrist and Pischke, 2008), equation (1) may have a potential problem estimating standard errors. The legislation (had a Chinese anti-miscegenation law) only varies at the state and year level, while I used individual-level data in my

analysis. The most widely used approach is to calculate standard errors clustered at one level higher than the level of problematic serial correlation, which, in my case, is the state level. This clustering allows for unrestricted serial correlation of an individual's error term within state across time and is easily applied in most statistical software. Therefore, I also estimated equation (2):

$$Y_{ist} = \delta\ antiCHNmar_{st} + \beta X_{ist} + age_{ist} + \alpha_s + \gamma_t + \mu_{st} + \varepsilon_{ist} \quad (2)$$

The only difference between equations (1) and (2) is that equation (2) further decomposes the error term to μ_{st}, a state-year shock, and ε_{ist}, the conventional individual-state-year specific term. ε_{ist} is assumed to be mean zero and serially uncorrelated. Some scenarios for μ_{st} are job shortages and anti-Chinese riots or violence in a state. These events are likely to be correlated across years within the state. Meanwhile, not properly correcting the standard errors leads to a standard error that is too small.

To capture the time series patterns across censuses, following Fryer (2007), I assumed that between 1880 and 1940, race was the most important attribute in the American marriage market for all racial groups. This assumption is plausible given the Chinese anti-miscegenation laws, and the series of Chinese Exclusion Acts.

Interracial marriage with Chinese during this time was illegal in fourteen states and possessed enormous social costs to non-Chinese spouses (Teng, 2013). Even in states without bans on interracial marriage with Chinese, marriages across racial lines were rare. ***Figure 3.4*** presents the share of Chinese inter-racial marriages in the period with enactment of Chinese anti-miscegenation laws (1880-1940) vs. Chinese inter-racial marriages in the 21st century. The share of Chinese interracial marriages remained very low in the years with enacted Chinese anti-miscegenation laws, including states that never passed Chinese anti-miscegenation laws. In stark contrast, after the year of 2000, the share of interracial marriages grew more than five times for the states that never enacted Chinese anti-miscegenation laws and increased fifteen times for the states that passed Chinese anti-miscegenation laws. This descriptive evidence counters the "long arch of history" view that claims long-lasting and lingering effects of past racist policies.

[insert figure 3.4 here]

3.4 Results

3.4.1 Descriptive Statistics

Figure 3.5 and ***Figure 3.6*** present the share of interracially married persons in each census by age for Chinese men and women, respectively. In general, the proportion of intermarried Chinese men and women is lower than 5%. Moreover, Chinese men have a higher share of interracial marriage than do Chinese women in each age group and census. This pattern is comparable to Fryer's findings (2007) about Asian intermarriage. Historical events such as gold mining, transcontinental railroad construction, and the Page Act of 1875, produced massive gender imbalances in the Chinese community. It is not difficult to envision that a higher proportion of Chinese men had to marry outside their ethnicity or be left in an enormous unmarried or never married community of single Chinese men.[21]

[insert figure 3.5 and figure 3.6 here]

Though ***Figures 3.5*** and ***3.6*** shed light on a positive relationship between an unbalanced sex ratio and the probability of interracial marriage, they do not reveal the differences between states that enacted laws vs. states that did not. ***Figures 3.7*** and

[21] Appendix Figure 2A and Figure 2B present the percentage of ever married men in each census by birth-cohort for Chinese men and women. By the age of 50, 76% of Chinese males were ever-married, while the number was 95% for women.

3.8 display the proportion of Chinese men and Chinese women who intermarried in states that passed Asian/Chinese anti-miscegenation laws and those that did not. States that never prohibited Chinese interracial marriages always had a higher share of residents that married outside the Chinese community. Meanwhile, men present a more stable trend than do women across census years. ***Table 3.3*** shows the characteristics for individuals aged 20 and over in states that did and did not enact Asian/Chinese anti-miscegenation laws, which are the individuals in the treatment and control groups. Women who resided in states with Asian/Chinese anti-miscegenation laws were on average 36 years old and slightly younger than women who lived in states without Chinese anti-miscegenation laws. Almost 40% of women in treated states could not read, and write and only 34% were born in the U.S. Meanwhile, more women in the comparison group were able to read and write and were born in the U.S. Moreover, 65% of women in the treated states lived in a city with a Chinatown, and 54% of female residents who lived in states that banned Chinese interracial marriages had more skewed sex ratios. In sum, women who resided in states that had Asian/Chinese anti-miscegenation laws had a greater ability to marry Chinese men, given the relatively high availability of potential Chinese partners.

[insert figure 3.7 and figure 3.8 here]

[insert Table 3.3 here]

On the other hand, men who resided in states with Chinese anti-miscegenation laws were on average 46 years old and much older than women who lived in the same states. Twenty percent of men were illiterate in treated states, while the number for comparison states is 22%. Unlike Chinese women, a smaller proportion of Chinese men were native-born. Ten percent of male residents in states that prohibited Chinese interracial marriages were born in the U.S., and the proportion for states that did not ban Chinese interracial marriages is 19%. Furthermore, 46% of men lived in a city with a Chinese ethnic enclave in states with Chinese anti-miscegenation laws.

In addition, ***Table 3.4*** displays the association between the states that *never* passed an Asian/Chinese anti-miscegenation law and the inter-racial marriage outcomes for all Chinese men and women at age of 20 and above. The dependent variable is a dummy variable indicator for the interracial married status in a specific census year. The Linear Probability Model (LPM) coefficients show that the passage of an Asian/Chinese anti-miscegenation law negatively associates with the probability that a Chinese man entered an interracial marriage by 4 percentage points. These effects are statistically significant for robust and state-clustered standard errors at least at a 5% significance level. In contrast, the passage of an Asian/Chinese anti-

miscegenation law does not have a statistically significant association with women's interracial married status after applying the state-cluster standard error (column (10) – column (12)). The insignificant results are not surprising given the small population of Chinese women in the late 19th and early 20th centuries. However, looking more closely at the positive coefficients for women and considering their spouses' racial heritage for all intermarried Chinese women (Appendix Table 1), white males are the dominant choice for Chinese women in interracial marriages. Given the historical racial hierarchy and racial inequity in the U.S., this may point to disparate treatment depending on whether a Chinese person chose to intermarry with a white or non-white person.

[insert Table 3.4 here]

However, without direct evidence on the counterfactual trend for the states that had Chinese anti-miscegenation laws, the LPM coefficients could be biased. The LPM coefficient could absorb the trends without law enforcement, such as within time changes to interracial marriages. Thus, the LPM estimates represent trend changes of Chinese interracial marriage plus the treatment effect of introducing a Chinese anti-miscegenation law. To avoid the bias from the simple LPM, I apply a

differences-in-differences estimator and use the trends for states that never enacted a Chinese anti-miscegenation law as the counterfactual outcome.

3.4.2 Main Specification

My main estimates are in ***Table 3.5.*** It includes all the individuals at age of 20 and above and separates males and females. The dependent variable is the same as ***table 3.4***, a dummy variable indicator for interracial married status in a specific census year. Columns (1) – (3) are the estimates of equation (1) controlling only for age; controlling for age, supply in the marriage market; and controlling for age, marriage supply, and occupation scores, respectively. Surprisingly, the passage of an Asian/Chinese anti-miscegenation law increases the probability that a Chinses man entered an interracial marriage by around 0.7 percentage points. These effects are small but statistically significant for heteroskedasticity-robust standard errors. As stated in the prior section, the Asian/Chinese anti-miscegenation laws varied at the state level, whereas the unit of observation is the individual level. Thus, to properly address correlation within a state, I applied the state clustered standard errors to the estimator. Clustering increases the standard errors of states that enacted Asian/Chinese anti-miscegenation laws, yielding a statistically insignificant law passage effect for men. In addition, the passage of an Asian/ Chinese anti-

miscegenation law has no statistically significant effect on women's interracial married status with and without the state cluster standard error (column (7) – column (12)).

[insert Table 3.5 here]

Furthermore, other social and demographic controls in the specifications agree with the literature. In agreement with the literature on hostility toward Chinese people in the late 19th and early 20th centuries, an ethnic enclave, namely a Chinatown, gave the Chinese an avenue for a social life and was an important place to meet potential Chinese spouses, decreasing the probability of interracial marriage. The Chinatown effect is greater for women than for men. Meanwhile, being born in the U.S. and literate could expand one's social network in ways that increased the probability of interracial marriage.

3.4.3 Testing the Robustness of Main Specification

The main results indicate that implementing an Asian/Chinese anti-miscegenation law had no statistically significant effect on both Chinese men's and women's incidence of interracial marriage. These findings contradict the expected legislation effect. Therefore, I conducted the following analysis to check the robustness of the results.

Due to the small population size of Chinese females, the robustness analyses were only applied to Chinese males.

First, I defined the comparison group as narrower than the main specification. As noted in the historical context, some states never enacted anti-miscegenation laws, and some repealed their laws before 1887. Accordingly, my narrow definition of the comparison group only includes states that still had anti-miscegenation laws in 1887 but did not explicitly exclude Chinese people from marrying whites (15 states). The differences between the treatment group and the more restrictive comparison group can be interpreted as the lower bound of the legislation effect. I present the results in ***Table 3.6***. It compares states that completely banned interracial marriage with the Chinese and states that did not explicitly include Chinese people in their laws. Consistent with the main specification, columns (1) – (3) adopt heteroskedasticity-robust standard errors, and columns (4) – (6) cluster standard errors on the state. Like the main specification, the enactment of an Asian/Chines anti-miscegenation law had no significant impact on Chinese male interracial marriage once applied the clustered stand errors.

[insert Table 3.6 here]

Second, I applied the event history analysis method (see, for example, MacKinlay, 1997; Heckman and Hotz, 1989) to test whether the parallel assumption holds. The event history analysis requires all of the year coefficients before the program—in this case, the enactment of Asian/Chinese anti-miscegenation laws—to be statistically insignificant to exclude the anticipatory effect of the legislation. That is to say, if the passage of Asian/Chinese anti-miscegenation laws impacted Chinese interracial marriage, we should not observe a significant correlation between the laws and Chinese interracial marriage before the laws were passed. Accordingly, I define the event window as the first census year after a specific state passed its first Asian/Chinese anti-miscegenation law and constructed a pre- and post-event window for 3 and 5 census years. The specification is Equation (3):

$$Y_{ist} = \sum_{l=1}^{3} \delta_l \, antiCHNmar_s * I_{[t^0-l]} + \sum_{k=0}^{5} \delta_k \, antiCHNmar_s * I_{[t^0+k]} + age_{ist} + \alpha_s + \gamma_t + \varepsilon_{ist} \quad (3)$$

Specifically, $I_{[t^0-l]}$ denotes to the census year *l* before the t^0, the first census year that states passed an Asian/Chinese anti-miscegenation law. $I_{[t^0+k]}$ represents the census year *k* after the t^0. δ_{-l} should not be statistically significant if the parallel trends assumption holds, and we do not observe the anticipatory effect of the law before it is passed. ***Figure 3.9*** plots the coefficient estimations and confidence intervals of the event dummy variables from specifications with and without

covariates. All estimates account for the year and state fixed effects. As ***figure 3.9*** significance tests are over 0.1 (***Appendix Table 3.2***), suggesting statistically insignificant "pre-program" effects and little evidence of different pre-trends in states that did and did not pass Asian/Chinese anti-miscegenation laws. Although the years after passage do not check the parallel trend assumption, they help to explain why the coefficient for Chinese males in table 3.5 is positively small. The coefficients on the periods after passage vary, and at the fifth period after passage, the coefficients are close to zero (-0.0003) and above zero (0.0006) when controlling for other covariates. Rather, the positive and larger coefficient from the third period prior to passage drew my attention. One legitimate question to ask is why some states passed laws targeting Chinese intermarriage and other states did not. Next, I examine the potential endogeneity of the passage of an Asian/Chinese anti-miscegenation law.

[insert Figure 3.9 here]

Assuming the enactment of an Asian/Chinese anti-miscegenation law is exogenous, the differences-in-differences estimator does not exclude a potential endogenous relationship between a law and interracial marriages. Rooted in racist thinking that Chinese immigrants could not assimilate, Chinese men were first brought to the U.S. to labor but not to stay (Moran, 2003). Exacerbated by the Page Act of 1875, the United States government made it nearly impossible for Chinese

women to put down roots, form families, and produce children who would be American by birth (Moran, 2003). Meanwhile, the entire U.S. population faced divergent sex ratios as a whole group (Mullen, 2011; IPUMS-HGIS, 2011). Counties in western states experienced higher male-to-female sex ratios than those on the east coast and in some central states. Relating an imbalanced white sex ratio to marriage means there is a shortage of white women but a surplus of white men. Among all the policies to increase the number of marriageable women, the prohibition of interracial marriages could be the most feasible. Thus, the passage of an Asian/Chinese anti-miscegenation law could be endogenous. To test the exogeneity of the legislation effect, I applied the by-county-age white-male-to-white-female sex ratio to the passage of an Asian/Chinese anti-miscegenation law and present the results in ***Table 3.7***. Columns (1) and (2) report the results using the restricted comparison group as mentioned earlier, and Columns (3) and (4) report the results using the full comparison group. After taking into account the possible endogenous relationship between the passage of an Asian/Chinese anti-miscegenation law and Chinese intermarried status, the enactment of a law decreases Chinese males' probability of intermarriage by 1 percentage point and the effect is statistically significant at the 10% level. Rather than use the average treatment effect, it is important to know that

the instrumental approach produces a local average treatment effect (LATE). It is the effect only for Chinese men whose interracial marriage decisions were affected by the passage of a law.

[Insert Table 3.7 here]

Last, I examined the legislation's impact on birth cohorts between 1876 and 1905. Although, as a snapshot, censuses do not track people over time, to understand if the average legislation effect differs in its impact on some cohorts, I restricted the following analysis to people born between 1876 and 1905. Inspired by Hacker (1999) and Fitch (2005), I constructed synthetic birth cohorts. People included in a synthetic cohort are from different censuses but are all treated as though they are in the same birth cohort.[22] I constructed the 1876-1885, 1886-1895, and 1896-1905 synthetic cohorts and present the results in ***Table 3.8***. In addition to the covariates in equation (1), a series of dummy indicators for the synthetic cohorts are included as controls. With the clustered-state standard errors (column (4) - column (6)), there is no statistically significant impact from enacting a law on the probability of being

[22] Helgertz et al. (2020) introduced a new strategy to link historical U.S. censuses. However, as noted in their working paper, the link for Asians is not as accurate as the link is for whites and blacks. To avoid unnecessary mismatches for individuals, I adopted the synthetic cohort method to perform the robustness check of the legislation impact.

intermarried. However, the ones without clustered-state standard errors (column (1)-column (3)), are negative and statistically significant. The average age of individuals in the synthetic cohorts was around 35, and the censuses covered them from 5 to 64, which is a complete life span to estimate marital status. They represent the "peak" impact period of the Asian/Chinese anti-miscegenation laws on intermarried status.

[insert Table 3.8 here]

In sum, contrary to the expected legislation effect of prohibiting interracial marriages for Asians/Chinese, the enactment of an Asian/Chinese anti-miscegenation law had no statistically significant effect on the incidence of interracial marriage for both Chinese men and women at age 20 and above. This finding is robust for a restricted comparison group, event history analysis, and synthetic cohort analysis. Exploring the possible selection on the passage of an Asian/Chinese anti-miscegenation law, the local average treatment effect returns negative effects, but only applies to the compliers.

3.5 Conclusions and Discussion

Policy analysts and demographers have developed a deeper understanding of marriage transitions and trends in the post-civil rights era and post-*Loving v. Virginia*.

Evaluating the impact of past laws on a small population, however, has been difficult. Restricted by the measurement of the small population, researchers have difficulties capturing most of the individuals in a small population and teasing out the effects of policies. Powered by the availability of the full count censuses, my study is able to answer the policy question: what was the effect of Asian/Chinese anti-miscegenation laws on Chinese interracial married status? While unlikely to directly inform the marriage patterns or family formation of Chinese Americans today, given the anti-miscegenation laws and Chinese exclusion acts were national repealed more than fifty years, my results indicate no statistically significant impact from Asian/Chinese anti-miscegenation legislation on the Chinese interracial married status.

My estimates emphasize the importance of properly applying cluster standard errors when using individual-level data to study state-level policy. Clustered standard errors allow for unrestricted serial correlation of the error terms of individuals within states across years (Abadie et al., 2017). As shown in my estimates, clustering increases the standard error of the coefficient on Chinese anti-miscegenation laws in all models, thus rendering the statistical insignificance of the impact of the law. The difference between the conventional and clustered standard errors on the other side

demonstrates the likely presence of serial correlation among individuals within states across years.

Despite assuming passage of an Asian/Chinese anti-miscegenation law as an external shock, a state that passed a law also faced a surplus of men. The animosity and sexual anxieties about Chinese men marrying white women (Leung, 2014), incarnated as "Yellow Peril" (Tchen and Yeats, 2014), was seen as a danger to society. Besides, as regulated by the Expatriation Act of 1907, American women who married Chinese men would lose their American citizenship. The severe consequences of interracial marriage to Chinese males could lead one to conclude that white women did not marry Chinese men even if they wanted to.

In contrast, white men were not targeted by the Expatriation Act of 1907. To solve the shortage of marriageable women, a white men could marry a Chinese woman and migrate to states that did not ban Chinese interracial marriages, as documented by Wallenstein (1994). Even Richard and Mildred Loving (*Loving v. Virginia* (1967)) pled guilty and were sentenced to one year in jail, but the sentence would be commuted for twenty-five years, so long as the couple did not return to Virginia together during that period (Richter, 2015). In my future research, more detailed coding and classification of anti-miscegenation laws is needed, such as which states did not recognize Chinese

interracial marriages performed in other states, and if any state also prohibited Chinese interracial marriage to non-whites (Loewen, 1988). Unfortunately, the historical census only provides marital status but not marital year. Without knowing the specific marital year, my estimates could be biased either way. As mentioned, if an intermarried Chinese moved to a different state because of his/her marital status, it underestimates the legislation effect.

According to the literature on immigrant assimilation, first-, second- and third-generation Americans are impacted differently by legislation (Borjas1985; Zhou, 1997). First- and second-generation Americans are most likely to be affected by anti-miscegenation laws based on evidence from different processes and consequences of assimilation (Xie and Greenman, 2011) or segmented assimilation (Portes and Zhou, 1993). My current estimates only contain one covariate on nativity: whether born in the U.S. In my future research, I will perform separate analyses for first-, second- and third-generation Americans. In addition, considering the new method that stresses variation in treatment timing (Goodman-Bacon, 2021), I will adopt the difference-in-difference decomposition method to include time-varying controls in the next step. The proposed method will help illustrate heterogeneous effects from different

enactment years of Chinese anti-miscegenation laws differ from simply summarizing the average treatment effects across states.

The null hypothesis, which I support—that the passage of Chinese anti-miscegenation laws had no impact on Chinese interracial marriages—suggests several possible conclusions about the history of Chinese anti-miscegenation law in the 19th and 20th centuries and policy implications for the 21st century. First, though neither were statistically significant in interracial marriage with the Chinese anti-miscegenation laws, Chinese men and women differed greatly in the incidence of marrying, given the extremely high Chinese sex ratio in the 19th century and first part of the 20th century in the U.S. The states that passed Chinese anti-miscegenation laws were also the states that had a surplus of white men. Possibly, white men who married Chinese women may have been charged with a misdemeanor crime and may have been arrested but they were not convicted, once again exposing the U.S.'s differential racial enforcement. Therefore, further historical and documented studies are needed to establish which impacts were observed.

Second, the evidence from my estimates also establishes the historical backdrop of the high incidence of Asian-white marriage in the 21st century. Because it had been banned for more than one hundred years, once it was legitimized and the

Chinese Exclusion Acts repealed, Asian-white interracial marriages occurred more frequently. The current policies have stronger effects than the lingering impacts of historic policies. My causal study of historical laws indicates the importance of how properly studying historical policy can aid in the understanding of current trends.

Figure 3. 1: U.S. States by Date that Repealed Anti-Miscegenation Laws

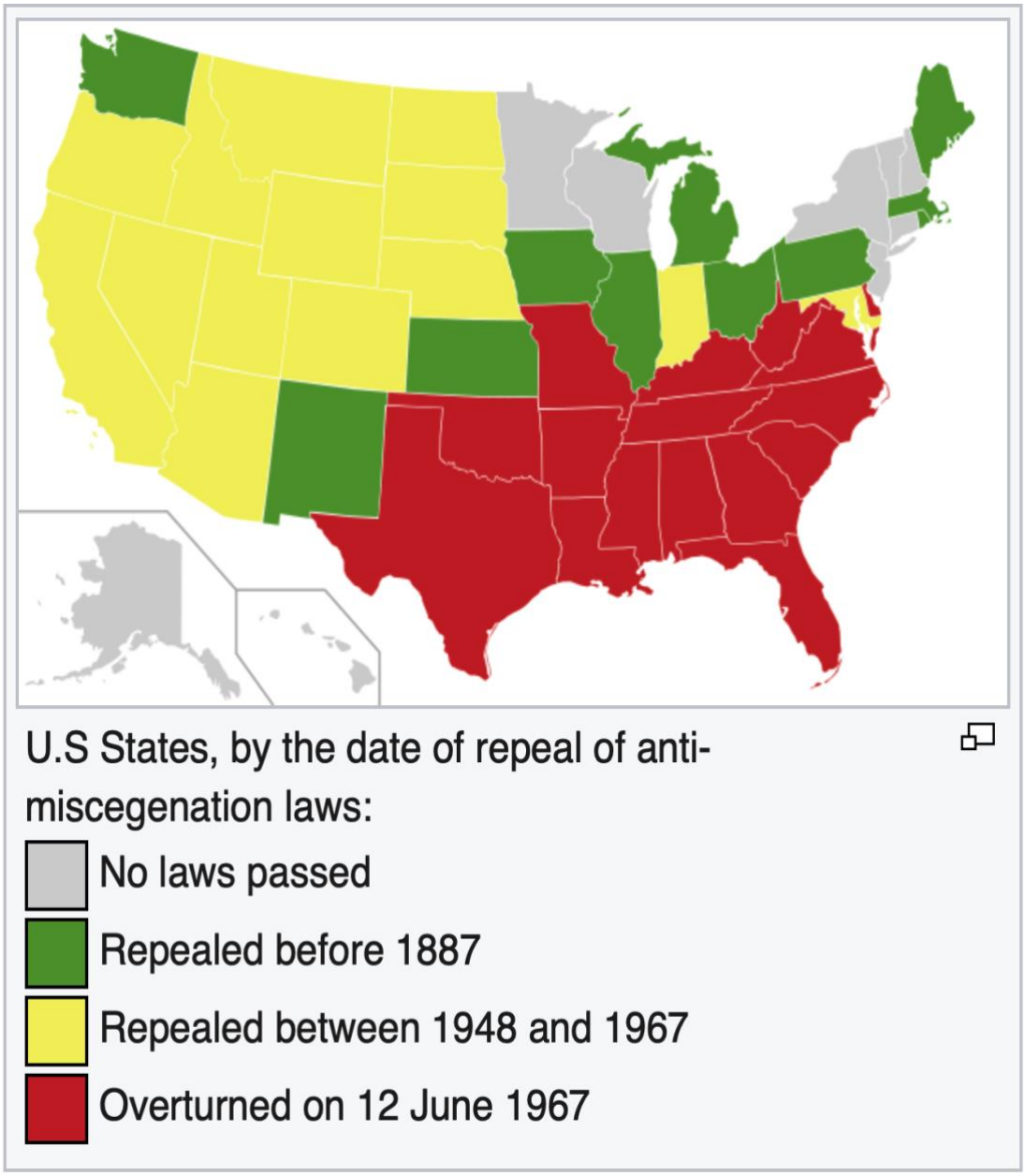
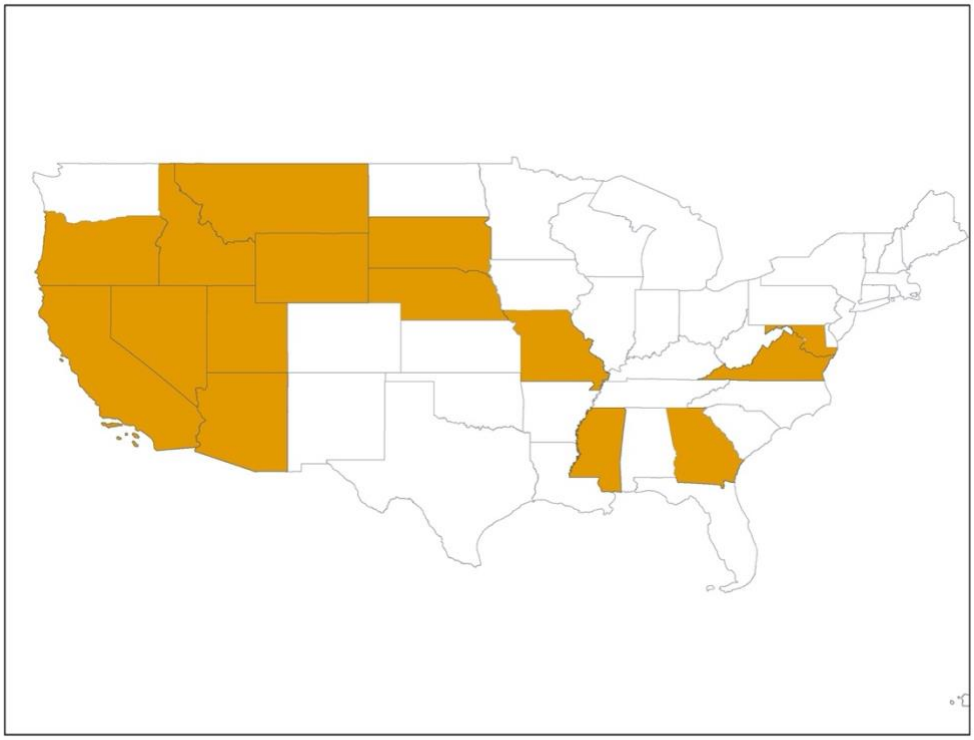
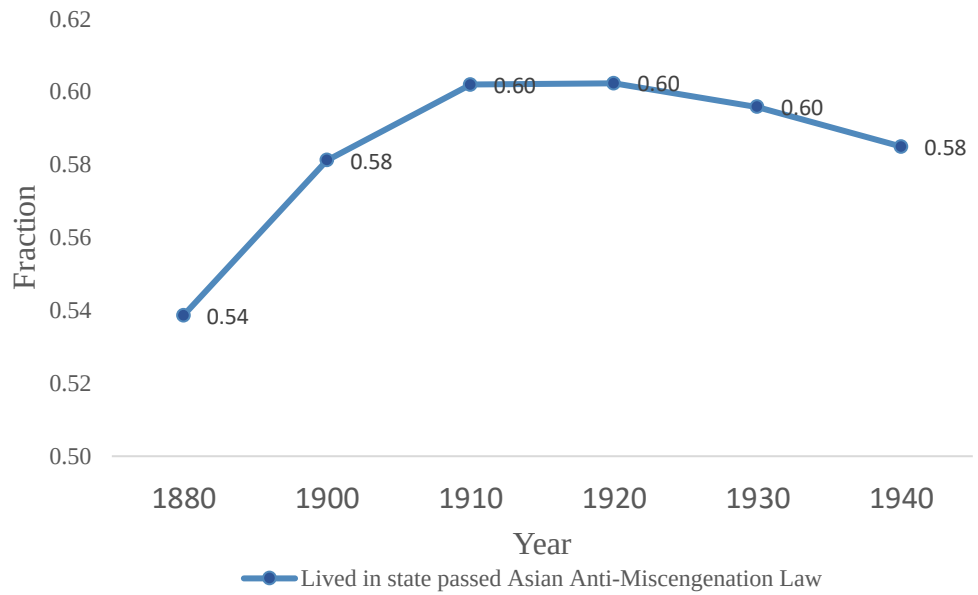


Figure 3. 2: U.S. States that Passed Chinese Anti-Miscegenation Laws



Note: States that passed Chinese Anti-Miscegenation Laws between 1860 to 1940 are in brown.

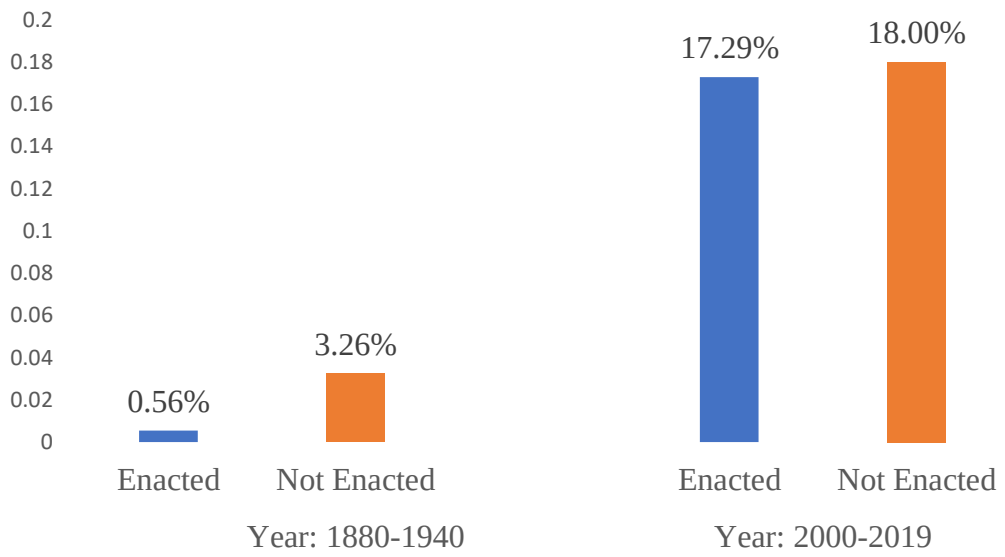
Figure 3. 3: Percentage of U.S. Chinese Population Subject to a Chinese Anti-Miscegenation Law



Source: IPUMS-USA Complete Count for 1880 –1940.

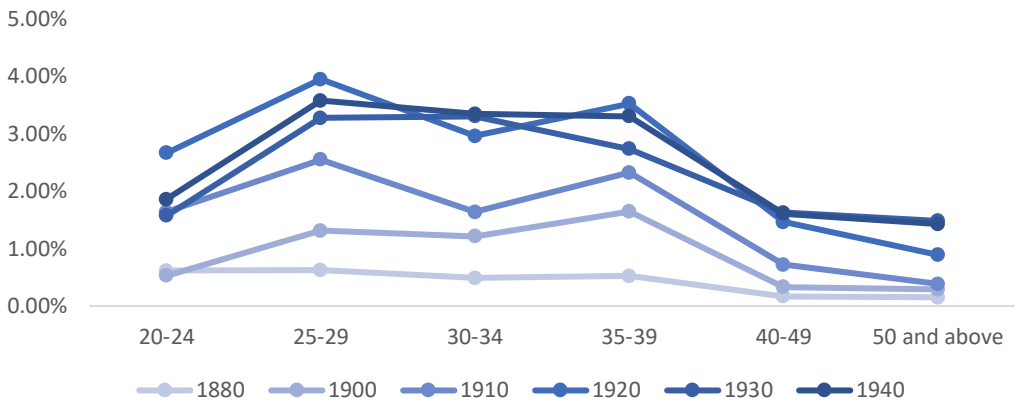
Note: Percentages calculated for Chinese population aged 20 and over.

Figure 3. 4: Share of Chinese Interracial Marriages in States that Did Enact vs. States that Did Not Enact Chinese Anti-Miscegenation Laws



Source: IPUMS-USA Complete Count for 1880 –1940.
IPUMS-USA 1% American Community Surveys (ACS) for 2000 –2019.

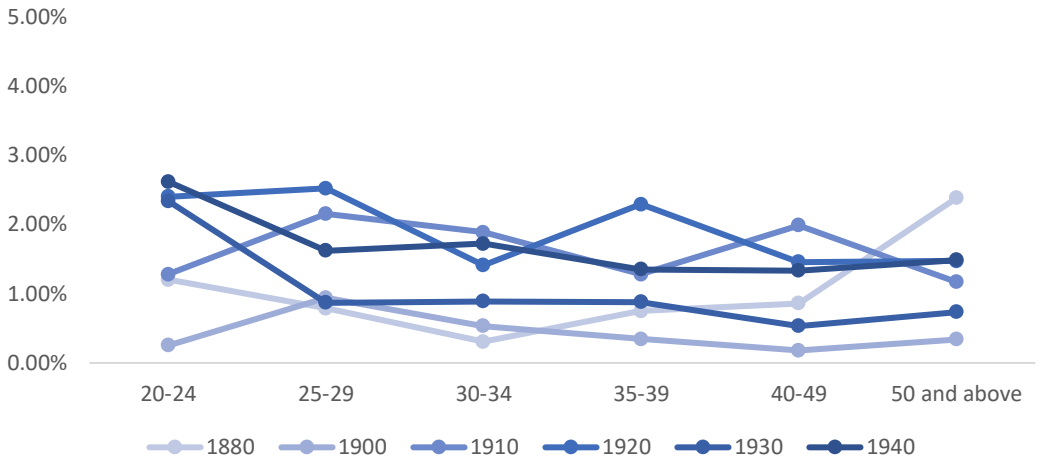
Figure 3. 5: Share of Chinese Men in Interracial Marriages by Age and Census



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Figure 3.5 includes Chinese men aged 20 and over.

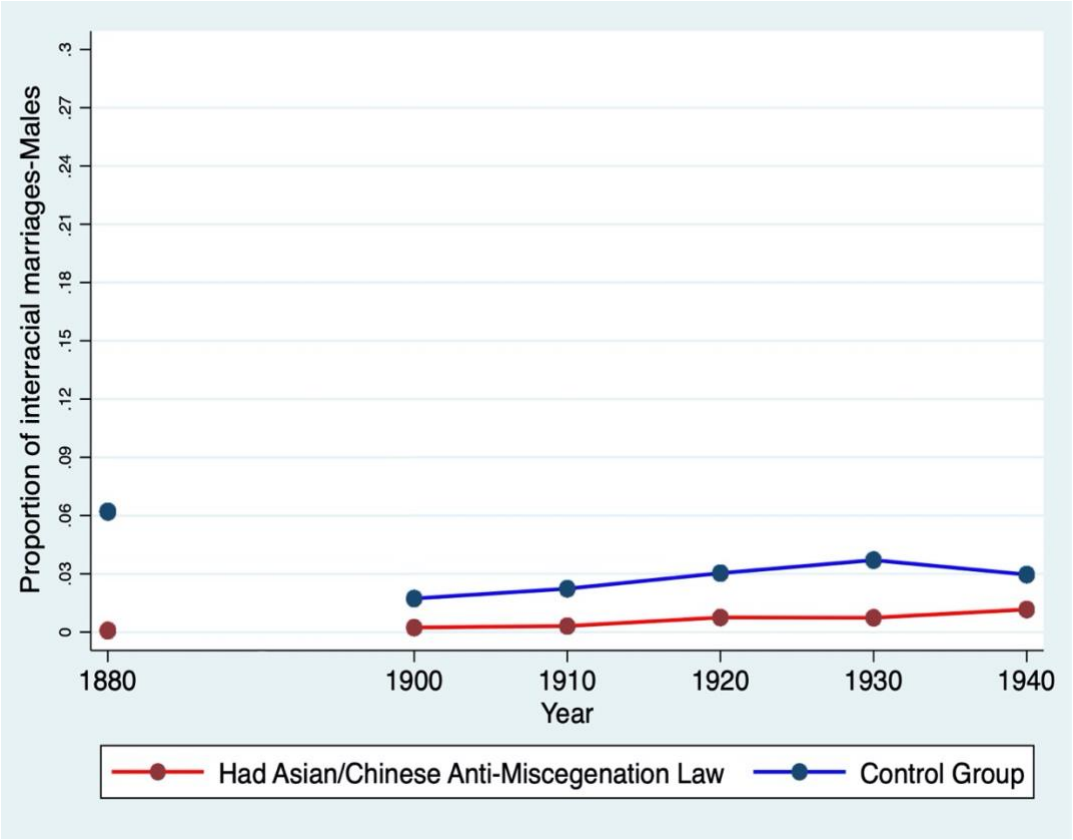
Figure 3. 6: Share of Chinese Women in Interracial Marriages by Age and Census



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Figure 3.6 includes Chinese women aged 20 and over.

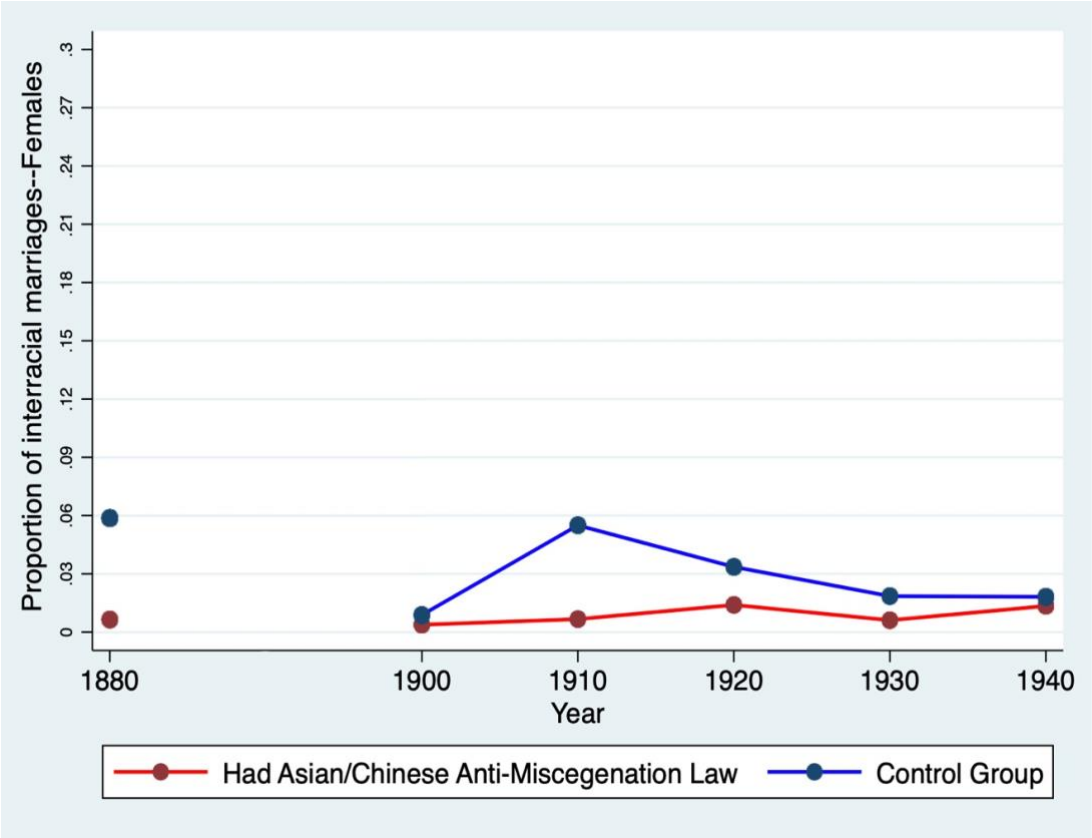
Figure 3. 7: Share of Interracial Married Chinese Men in States That Did Enact vs. States That Did Not Enact Chinese Anti-Miscegenation Laws



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Figure 3.7 includes Chinese men aged 20 and over.

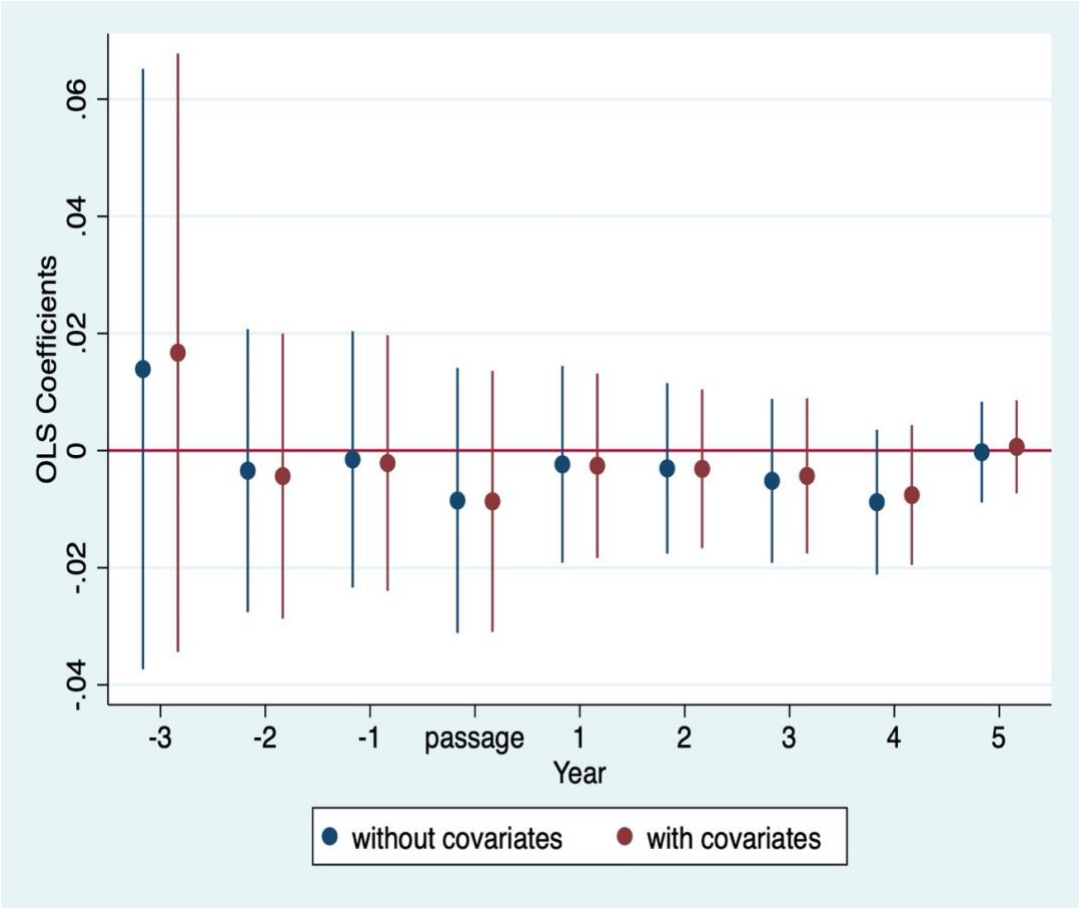
Figure 3. 8: Share of Interracial Married Chinese Women in States That Did Enact vs. States That Did Not Enact Chinese Anti-Miscegenation Laws



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Figure 3.8 includes Chinese women aged 20 and over.

Figure 3. 9: Event Study of the Effect of Chinese Anti-Miscegenation Laws on Chinese Men Interracial Marriages



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Figure 3.9 includes Chinese men aged 20 and over.

Table 3 1: Year Each State Enacted and Repealed Its First Asian Anti-Miscegenation Law

State	Admission to the union	First anti-miscegenation law	First ASIAN anti-miscegenation law	Before statehood	Repealed	Races banned from marrying whites
Nevada	1864	1861	1861	Y	1959	Blacks, Native Americans, Asians, Filipinos
Idaho	1890	1864	1864	Y	1959	Blacks, Native Americans, Mongolians
Arizona	1912	1865	1865	Y	1962	Blacks, Native Americans, Asians
Oregon	1859	1862	1866		1951	Blacks, Native Americans, Asians, Native Hawaiians
California	1850	1850	1880		1948	Blacks, Asians
Utah	1896	1852	1888	Y	1963	Blacks, Mongolians, Filipinos (Malays)
Mississippi	1817	1822	1892		1987	Blacks, Mongolians
Missouri	1821	1835	1909		1969	Blacks, Mongolians
Montana	1889	1909	1909		1953	Blacks, Chinese, Japanese
Nebraska	1867	1855	1913		1963	Blacks, Chinese, Japanese, Filipinos
South Dakota	1889	1909	1913		1957	Blacks, Asians
Wyoming	1890	1869	1913		1965	Blacks, Mongolians, Filipinos (Malays)
Virginia	1788	1691	1924		1968	All non-whites (colored)
Georgia	1788	1750	1927		1972	Blacks, Native Americans, Asians
Maryland	1788	1692	1935		1967	Blacks, Malays

Note: States are ordered by date first Asian anti-miscegenation law enacted.

Table 3 2: Historical Chinatowns in the U.S.

City, State	Year Founded	Year Closed	City, State	Year Founded	Year Closed
Almy, WY	1870	1927	Pittsburgh, PA	1900	1950
Baltimore, MD	1880	1920	Portland, ME	1890	1960
Big Timber, MT	1880	1930	Portland, OR	1850	/
Boston, MA	1875	/	Providence, RI	1890	1951
Butte, MT	1868	1940	Reno, NV	1855	1878
Cedar Creek, MT	1870	/	Rock Springs, WY	1870	1927
Chicago, IL	1880	/	Sacramento, CA	1850	1915
Cleveland, OH	1920	/	Saint Louis, MO	1869	1966
Deadwood, SD	1860	/	Salem, OR	1870	/
Denver, CO	1870	1940	Salinas, CA	1868	/
Detroit, MI	1917	2000	Salt Lake City, UT	1860	1952
Eureka, CA	1880	/	Ventura, CA	1866	1923
Evanston, WY	1870	1927	San Diego, CA	1870	/
Fresno, CA	1872	/	San Francisco, CA	1848	/
Helena, MT	1880	1970	San Jose, CA	1866	1931
Honolulu, HI		/	Santa Rosa, CA	1910	/
Houston, TX	1930	/	Seattle, WA	1880	1930
Los Angeles, CA	1880	/	Spokane, WA	1883	1940
New Orleans, LA	1860	1937	Stockton, CA	1850	1950
New York, NY	1870	/	Tacoma, WA	1880	1900
Newark, NJ	1875	1950	Tucson, AZ	1880	1960
Oakland, CA	1848	1940	Vallejo, CA	1880	/
Oklahoma City, OK	1900	1920	Walla Walla, WA	1880	1962
Omaha, NE	1860	1950	Washington, DC	1880	/
Philadelphia, PA	1870	/			

Table 3 3: Descriptive Statistics for Chinese Lived in States That Did Enact vs. States That Did Not Enact Chinese Anti-Miscegenation Laws

	Enacted Asian/China Anti-Miscegenation Laws					
	Chinese Females			Chinese Males		
	Mean	SD.	N	Mean	SD.	N
Age	35.97	10.9	18,157	46.02	11.85	171,414
Illiteracy	0.39	0.49	18,157	0.2	0.4	171,414
US Born	0.34	0.47	18,157	0.1	0.3	171,414
Chinatown in City	0.65	0.48	18,157	0.46	0.5	171,414
Occupation score *(highest 80)*	3.58	8.81	18,157	17.56	12.2	171,414
Skewed sex ratio *(=1, if sex ratio>=10)*	0.54	0.5	18,019	0.84	0.37	170,029

	Did Not Enact Asian/China Anti-Miscegenation Laws					
	Chinese Females			Chinese Males		
	Mean	SD	N	Mean	SD	N
Age	36.44	11.18	8,434	44.8	10.58	70,049
Illiteracy	0.2	0.4	8,434	0.22	0.42	70,049
US Born	0.55	0.5	8,434	0.19	0.39	70,049
Chinatown in City	0.53	0.5	8,434	0.58	0.49	70,049
Occupation score *(highest 80)*	3.02	7.96	8,434	18.02	13.24	70,049
Skewed sex ratio *(=1, if sex ratio>=10)*	0.47	0.5	8,208	0.86	0.35	69,045

Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Table 3.3 includes Chinese aged 20 and over.

Table 3 4: Linear Probability Model Estimates of Enactment of Chinese Anti-Miscegenation Laws on Chinese Interracial Married Status

	Chinese Male					
	No Clustering			Clustering		
	(1)	(2)	(3)	(4)	(5)	(6)
Passed Chinese Anti -Miscegenation Law	-0.0402***	-0.0404***	-0.0413***	-0.0402**	-0.0404**	-0.0413**
	(0.0004)	(0.0010)	(0.0014)	(0.0201)	(0.0205)	(0.0205)
Chinatown in city		-0.0016	-0.0021**		-0.0016***	-0.0021***
		(0.0010)	(0.0009)		(0.0005)	(0.0005)
US born		0.0130***	0.0127***		0.0130***	0.0127***
		(0.0043)	(0.0040)		(0.0010)	(0.0010)
Illiteracy		-0.0054**	-0.0050**		-0.0054***	-0.0050***
		(0.0026)	(0.0023)		(0.0004)	(0.0004)
Skewed Sex Ratio		0.0019	0.0025		0.0019	0.0025
		(0.0016)	(0.0016)		(0.002)	(0.002)
Age control	Yes	Yes	Yes	Yes	Yes	Yes
Occupation control	No	No	Yes	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	241,463	239,074	239,074	241,463	239,074	239,074
	Chinese Female					
	No Clustering			Clustering		
	(7)	(8)	(9)	(10)	(11)	(12)
Passed Chinese Anti -Miscegenation Law	0.0244***	0.0324***	0.0322***	0.0244	0.0324	0.0322
	(0.0014)	(0.0018)	(0.0018)	(0.0227)	(0.0238)	(0.0238)
Chinatown in city		-0.0074***	-0.0075***		-0.0074***	-0.0075***
		(0.0019)	(0.0019)		(0.0018)	(0.0018)
US born		0.0116***	0.0117***		0.0116***	0.0117***
		(0.0035)	(0.0035)		(0.0017)	(0.0017)
Illiteracy		-0.0039***	-0.0040***		-0.0039***	-0.0040***
		(0.0013)	(0.0014)		(0.0013)	(0.0013)
Skewed Sex Ratio		-0.0003	-0.0003		-0.0003	-0.0003
		(0.0030)	(0.0030)		(0.0024)	(0.0024)
Age control	Yes	Yes	Yes	Yes	Yes	Yes
Occupation control	No	No	Yes	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,591	26,227	26,227	26,591	26,227	26,227

Source: IPUMS-USA Complete Count for 1880 –1940.

Notes: Table 3.4 includes Chinese aged 20 and over.

Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 5: Diff-in-Diff Estimates of Chinese Anti-Miscegenation Laws on Chinese Interracial Married Status

	Chinese Male					
	No Clustering			Clustering		
	(1)	(2)	(3)	(4)	(5)	(6)
Chinese Anti - Miscegenation Law	0.0069***	0.0066***	0.0069***	0.0069	0.0066	0.0069
	(0.0014)	(0.0014)	(0.0014)	(0.0051)	(0.0052)	(0.0053)
Chinatown in city		-0.0014***	-0.0019***		-0.0014	-0.0019*
		(0.0005)	(0.0005)		(0.0011)	(0.0010)
US born		0.0130***	0.0127***		0.0130***	0.0127***
		(0.0010)	(0.0010)		(0.0043)	(0.0040)
Illiteracy		-0.0054***	-0.0050***		-0.0054**	-0.0050**
		(0.0004)	(0.0004)		(0.0026)	(0.0023)
Skewed Sex Ratio		0.0024***	0.0029***		0.0024	0.0029
		(0.0007)	(0.0007)		(0.0017)	(0.0018)
Age control	Yes	Yes	Yes	Yes	Yes	Yes
Occupation control	No	No	Yes	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	241,463	239,074	239,074	241,463	239,074	239,074
	Chinese Female					
	No Clustering			Clustering		
	(7)	(8)	(9)	(10)	(11)	(12)
Chinese Anti - Miscegenation Law	0.0009	-0.0044	-0.0042	0.0009	-0.0044	-0.0042
	(0.0064)	(0.0058)	(0.0058)	(0.0069)	(0.0056)	(0.0056)
Chinatown in city		-0.0075***	-0.0076***		-0.0075***	-0.0076***
		(0.0018)	(0.0018)		(0.0018)	(0.0019)
US born		0.0116***	0.0117***		0.0116***	0.0117***
		(0.0017)	(0.0017)		(0.0035)	(0.0036)
Illiteracy		-0.0038***	-0.0039***		-0.0038***	-0.0039***
		(0.0013)	(0.0013)		(0.0013)	(0.0014)
Skewed Sex Ratio		-0.0005	-0.0005		-0.0005	-0.0005
		(0.0024)	(0.0024)		(0.0030)	(0.0030)
Age control	Yes	Yes	Yes	Yes	Yes	Yes
Occupation control	No	No	Yes	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,591	26,227	26,227	26,591	26,227	26,227

Source: IPUMS-USA Complete Count for 1880 –1940.

Notes: Table 3.5 includes Chinese aged 20 and over.

Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 6: The Impact of Enactment of Chinese Anti-Miscegenation Laws on Chinese Men Interracial Married Status, Restricted Comparison Group

	No Clustering			Clustering		
	(1)	(2)	(3)	(4)	(5)	(6)
Chinese Anti - Miscegenation Law	0.0026**	0.0021	0.0020	0.0026	0.0021	0.0020
	(0.0013)	(0.0013)	(0.0013)	(0.0034)	(0.0033)	(0.0033)
Chinatown in city		-0.0021***	-0.0022***		-0.0021***	-0.0022***
		-0.0004	(0.0004)		(0.0007)	(0.0007)
US born		0.0074***	0.0074***		0.0074***	0.0074***
		(0.0010)	(0.0010)		(0.0019)	(0.0019)
Illiteracy		-0.0017***	-0.0016***		-0.0017***	-0.0016***
		(0.0004)	(0.0004)		(0.0005)	(0.0004)
Skewed Sex Ratio		0.0002	0.0004		0.0002	0.0004
		(0.0007)	(0.0007)		(0.0010)	(0.0011)
Age control	Yes	Yes	Yes	Yes	Yes	Yes
Occupation control	No	No	Yes	No	No	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	180,235	178,642	178,642	180,235	178,642	178,642

Source: IPUMS-USA Complete Count for 1880 –1940.

Notes: Table 3.6 includes Chinese men aged 20 and over.

Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 7: Two-Stage Least Square Estimates of the Impact of Enactment of Chinese Anti-Miscegenation Laws on Chinese Men Interracial Married Status

	Restricted Comparison Group		Broad Comparison Group	
	(1)	(2)	(3)	(4)
Asian/Chinese Anti -Miscegenation Law		-0.0106*		-0.0141*
		(0.0059)		(0.0084)
White male to female sex ratio	0.0299***		0.0290***	
	(0.0054)		(0.0059)	
Instrument F-statistic	30.44		24.19	
Age control	Yes	Yes	Yes	Yes
Occupation control	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Observations	178,642	178,642	239,037	239,037
R2-adjusted	0.0307		0.0274	

Source: IPUMS-USA Complete Count for 1880 –1940.

Notes: Table 3.7 includes Chinese men aged 20 and over.

Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3 8: The Impact of Enactment of Chinese Anti-Miscegenation Laws on Chinese Men Interracial Married Status, Synthetic Cohorts

	No Clustering			Clustering		
	(1)	(2)	(3)	(4)	(5)	(6)
Chinese Anti - Miscegenation Law	-0.0184***	-0.0209***	-0.0220***	-0.0184	-0.0209	-0.0220
	(0.0066)	(0.0068)	(0.0068)	(0.0135)	(0.0139)	(0.0141)
Chinatown in city		-0.0005	-0.0015		-0.0005	-0.0015
		(0.0009)	(0.0009)		(0.0024)	(0.0024)
US born		0.0143***	0.0141***		0.0143***	0.0141***
		(0.0012)	(0.0012)		(0.0051)	(0.0048)
Illiteracy		-0.0127***	-0.0118***		-0.0127***	-0.0118***
		(0.0009)	(0.0009)		(0.0043)	(0.0040)
Skewed Sex Ratio		0.0054***	0.0059***		0.0054**	0.0059**
		(0.0013)	(0.0013)		(0.0026)	(0.0027)
Age control	Yes	Yes	Yes	Yes	Yes	Yes
Occupation control	No	No	Yes	No	No	Yes
	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Synthetic cohort fix effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	103,135	101,819	101,819	103,135	101,819	101,819

Source: IPUMS-USA Complete Count for 1880 –1940.

Notes: Table 3.8 includes Chinese men born between 1865 and 1905.

Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Synthesis and Conclusions

This dissertation has explored and examined the structural factors affecting marriage outcomes in China and Chinese Americans in the United States. My three empirical studies indicate that laws and public policies impact deviations from family formation traditions and norms and produce inequalities. Specifically:

1) Expected to create greater unity within the Chinese economy, Han-Ethnic Minzu intermarriage is commonly conceptualized as ethnic Minzu people marrying-up with Han to improve socioeconomic status. My results, however, do not support the marry-up belief in terms of incomes, since ethnic Minzu people do not statistically gain economic benefit from intermarrying Han. Furthermore, Han-Ethnic Minzu intermarriages are not evenly distributed across educational achievement in Western China. Therefore, if the Han-Ethnic Minzu intermarriage can harmonize the relationship between Han and Minzu, policymakers would focus on the persons at the lower end of educational distribution.

2) Complicated by the remnant of the one-child policy and the male preference in China, the skewed male-to-female sex ratio puzzles the emergence of female headship in China. Stressing the economic desirability or attractiveness of

men, my measure of the male supply in the marriage market only includes unmarried and employed men. After controlling for the economic attractiveness of unmarried men, my estimates suggest differing links between marriageable males and the prevalence of female-headed households between majority Han and ethnic Minzu women. Ethnic Minzu women are negatively disparately impacted by the supply of males with economic desirability for family formation in China.

In addition, after the 21st century, an increasing number of men in rural China had arranged marriages and there was some bride trafficking from Southeast and South Asia. Meanwhile, domestically, China is experiencing an upward trend of female family headship. One critical piece of the two-sided puzzle is the economic ability of unmarried men. To improve the economic ability of unmarried men, policymakers have come up with different pathways and targeted programs for Han and ethnic Minzu to provide employment opportunities and increase job availability.

3) Designed to maintain racial purity and preclude interracial marriage with whites, fourteen out of forty-one U.S. anti-miscegenation laws forbade Chinese citizens to marry whites. At the same time, a series of Chinese exclusion acts discriminated against Chinese immigrants in terms of coming and starting a family in the United States. Remaining at a low level and below 5% for of all marriages until

the 1940s, my estimates, however, do not show a statistical impact of anti-miscegenation laws on Chinese interracial marital status. In contrast to the interracial marriage trends with the enactment of Chinese anti-miscegenation laws, after the national repeal of anti-miscegenation laws in 1968 and up until today, the number of Asian/Chinese intermarriages has sharply increased.

Studying the historical legislative effects provides the backdrop for the upsurge of Asian/Chinese intermarriages in the late 20th century. The legitimization of interracial marriage between Chinese and white citizens encouraged and incentivized people to seek this kind of intimate relationship. Though Chinese-white interracial marriage might be expected to remain at low level, given the more than one-hundred-year history of prohibition, the current policies have stronger effects than the fading residual impacts of historical policies.

Addressing how systematic factors affect family structures and marriage norms and result in inequalities, this dissertation offers new evidence and insights into how the most intimate personal relation, marriage, is policy relevant. Reflecting historical laws targeting Chinese Americans in the United States and recent family planning policy and marriage law in China, the results of this study expand the understanding of circumstances for ethnic minorities in the marriage market. The

proposed policy implications promote using family structure as a key factor in understanding and reducing racial inequalities.

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Appendix

Appendix Table 1. 1: Articles of Equal Protection for Inter-Ethnic Marriage from National Marriage Laws

Year	Articles of Protection for Inter-Ethnic Marriage
1950	***Article 1*** Abolish the feudal arranged marriage system. ***Article 3*** Marriage must be based upon the complete willingness of both man and woman. Neither party may use compulsion on the other party and no third party may interfere. ***Article 27*** The people's congresses in national autonomous areas shall have the right to formulate certain adaptations in light of the specific conditions of the local nationalities in regard to marriage and family.
1981 and 2001	***Article 2*** A marriage system based on the free choice of partners, on monogamy and on equality between man and woman shall be applied. ***Article 5*** Marriage must be based on the complete willingness of both man and woman. Neither party may use compulsion on the other party and no third party may interfere. ***Article 50*** The people's congresses in national autonomous areas shall have the right to formulate certain adaptations in light of the specific conditions of the local nationalities in regard to marriage and family. Provisions of adaptations formulated by autonomous prefectures and autonomous counties must be submitted to the standing committee of the People's Congress of the relevant province or autonomous region or municipality directly under the Central Government for approval. Provisions of adaptations formulated by autonomous regions must be submitted to the Standing Committee of the National People's Congress for the record.

Appendix Table 1. 2: Provincial- and County- Level Adaptations of the National Marriage Law in Ethnic Minority Residential Areas

	Year	Minimum Marriage Age [1]	Religion [2]	Equal Protection of Interethnic Marriage [3]	Note
Province Level:					
Xin Jing Uyghur	1981, 1983,1988,1990	Yes	Yes		
Xi Zang Tibetan	1982, 2004	Yes	Yes		Respect the ethnic marriage traditions without prejudice the marriage freedom.
Ning Xia Hui	1981	Yes		Yes	
Nei Mongol	1981, 1988, 2003	Yes			
County Level:					
Gui Zhou					
Qian Nan Buyi-Miao	1985, 1994	Yes		Yes	
Zi Yun Miao	1983-2003	Yes		Yes	
Song Tao Miao	1985-2002	Yes		Yes	
Zhen Ning Buyi-Miao	1985-2009	Yes		Yes	
Qing Hai					
Xunhua Salar	1981	Yes		Yes	
Hua Long, Hui	1981	Yes	Yes	Yes	
Huang Nan Tibetan	1982	Yes	Yes	Yes	
He Nan Mongolian	1982	Yes	Yes	Yes	
Hai Xi Mongolian-Tibetan	1983	Yes			
Hai Bei Tibetan	1983	Yes		Yes	
Hu Zhu Tu	1983	Yes	Yes	Yes	

	Year	Minimum Marriage Age [1]	Religion [2]	Equal Protection of Interethnic Marriage [3]	Note
Min He Hui	1986	Yes			
Da Tong Hui	1987	Yes	Yes	Yes	
Yu Shu Tibetan	1987	Yes	Yes	Yes	Respect the ethnic marriage traditions without prejudice the national marriage law.
Guo Luo Tibetan	1987	Yes	Yes	Yes	
Si Chuan					
A Ba Tibetan-Qiang	1984, 1988	Yes			
E Bian Yi	1989	Yes			Protection of interethnic marriage with Yi
Ma Bian Yi	1992	Yes		Yes	
Gan Su					
Aksay Kazakh	1993	Yes			
Xin Jiang					
Ili Kazakh	1987，2005	Yes	Yes	Yes	
Yun Nan					
Meng Lian	1981	Yes			
Cang Yuan Wa	1981	Yes			
Ning Lang Yi	1981	Yes			
Xi Meng Yi	1982	Yes			
Geng Ma Dai-Wa	1982	Yes			

Notes:1. Approved minimum legal marriage age: Male 20, Female 18 in ethnic autonomous regions.

2. Mention of religion cannot interfere with marriage.

3. The full articles in the regulations are written as “both men and women have marriage freedom” and “interethnic marriage is equally protected, and no one or a third party may interfere.”

Appendix Table 1. 3: Full Regression of Impact of Han-Minzu Intermarriage on Income in Western China

	(1)	(2)	(3)	(4)	(5)	(6)
	Female			Male		
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Han-Minzu Intermarriage	0.1317***	.	0.1598	0.1254***	.	-0.0979
	(0.0507)	(.)	(0.3640)	(0.0375)	(.)	(0.3751)
Minzu Status	-0.1153***	0.0785***	-0.1118**	-0.1589***	0.0235**	-0.1617***
	(0.0393)	(0.0141)	(0.0511)	(0.0278)	(0.0114)	(0.0321)
Living in Rural	-1.2867***	-0.1318***	-1.2835***	-1.2502***	-0.1193***	-1.2654***
	(0.0539)	(0.0139)	(0.0616)	(0.0380)	(0.0112)	(0.0521)
Muslim	-0.1080	-0.0964***	-0.1306*	-0.1060**	-0.0459***	-0.1075**
	(0.0734)	(0.0235)	(0.0789)	(0.0453)	(0.0175)	(0.0508)
Age	0.0301*	0.0002	0.0210	0.0292**	0.0090**	0.0295***
	(0.0172)	(0.0047)	(0.0135)	(0.0116)	(0.0038)	(0.0108)
Age squared	-0.0004*	-0.0000	-0.0003*	-0.0004***	-0.0001**	-0.0004***
	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0000)	(0.0001)
CCP membership	0.2702***	0.0248	0.2634***	0.1782***	0.0136	0.1767***
	(0.0481)	(0.0182)	(0.0535)	(0.0349)	(0.0116)	(0.0318)
College or higher degree	0.7687***	0.0561**	0.7619***	0.3842***	0.0762***	0.4078***
	(0.0573)	(0.0226)	(0.0687)	(0.0433)	(0.0174)	(0.0541)
Some college but not a four-year degree	0.6001***	0.0531***	0.6080***	0.3141***	0.0343**	0.3259***
	(0.0540)	(0.0187)	(0.0580)	(0.0433)	(0.0155)	(0.0438)
Self employed	0.2922***	0.0481***	0.2951***	0.3495***	-0.0028	0.3596***
	(0.0606)	(0.0180)	(0.0549)	(0.0448)	(0.0135)	(0.0362)

	Female			Male		
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Migrant worker	0.9379***	0.0116	0.9278***	0.5650***	0.0028	0.5564***
	(0.0668)	(0.0211)	(0.0613)	(0.0450)	(0.0142)	(0.0379)
Ever had a local equal protection clause of Han-Ethnic Minzu		-0.0412**			-0.0484**	
		(0.0187)			(0.0224)	
Support Han-Minzu Intermarriage		0.0919***			0.0666***	
		(0.0124)			(0.0099)	
Constant	8.9271***	0.0907	9.2014***	9.5430***	-0.0548	9.7416***
	(0.3554)	(0.0959)	(0.2768)	(0.2432)	(0.0824)	(0.2159)
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,114	4,045	4,045	5,956	5,855	5,855
R2-adjusted	0.378	0.133	0.378	0.395	0.118	0.388
Chi-squared			2,476			3,773

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: CHES 2011.

Note: Appendix Table 1.3 includes married individuals between ages 16-60.

Appendix Table 1. 4: Full Regression of Impact of Han-Minzu Intermarriage on Income in Western China for Ethnic-Minzu

	(1)	(2)	(3)	(4)	(5)	(6)
	Ethnic-Minzu Female			Ethnic-Minzu Male		
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Han-Minzu Intermarriage	0.0677	.	0.5588	0.2663***	.	0.1852
	(0.0792)	(.)	(0.8654)	(0.0482)	(.)	(0.4005)
Living in Rural	-1.3784***	-0.2126***	-1.2775***	-1.2457***	-0.1610***	-1.2578***
	(0.0851)	(0.0204)	(0.1912)	(0.0546)	(0.0143)	(0.0798)
Muslim	-0.0036	-0.1589***	0.0750	-0.0782	-0.0951***	-0.0626
	(0.1071)	(0.0251)	(0.1581)	(0.0624)	(0.0161)	(0.0650)
Age	-0.0163	0.0040	-0.0246	0.0190	-0.0034	0.0168
	(0.0233)	(0.0065)	(0.0201)	(0.0147)	(0.0044)	(0.0133)
Age squared	0.0003	-0.0000	0.0003	-0.0003	0.0001	-0.0002
	(0.0003)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
CCP membership	0.3394***	0.0056	0.3153***	0.2018***	0.0305**	0.2066***
	(0.0664)	(0.0258)	(0.0789)	(0.0432)	(0.0146)	(0.0455)
College or higher degree	0.8006***	-0.0085	0.8125***	0.4226***	0.0851***	0.4338***
	(0.0861)	(0.0290)	(0.0889)	(0.0597)	(0.0197)	(0.0664)
Some college but not a four-year degree	0.7007***	-0.0381	0.7579***	0.4170***	-0.0374*	0.4169***
	(0.0948)	(0.0259)	(0.0857)	(0.0575)	(0.0192)	(0.0599)
Self employed	0.2714**	0.1362***	0.2114	0.2953***	0.0265	0.2970***
	(0.1070)	(0.0262)	(0.1379)	(0.0711)	(0.0175)	(0.0531)

	Ethnic-Minzu Female			Ethnic-Minzu Male		
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Migrant worker	0.8860***	-0.0093	0.8783***	0.5603***	0.0328**	0.5580***
	(0.0746)	(0.0283)	(0.0871)	(0.0496)	(0.0166)	(0.0513)
Ever had a local equal protection clause of Han-Ethnic Minzu		-0.0469			-0.1985***	
		(0.0448)			(0.0273)	
Support Han-Minzu Intermarriage		0.0591***			0.0227*	
		(0.0177)			(0.0127)	
Constant	9.5728***	0.1872	9.6198***	9.4704***	0.4061***	9.7663***
	(0.4610)	(0.1345)	(0.4487)	(0.2984)	(0.0940)	(0.2885)
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,099	2,072	2,072	3,266	3,214	3,214
R2-adjusted	0.390	0.196	0.378	0.407	0.178	0.403
Chi-squared			1340			2171

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: CHES 2011.

Note: Appendix Table 1.4 includes married ethnic Minzu individuals between ages 16-60.

Appendix Table 1. 5: Full Regression of Impact of Han-Minzu Intermarriage on Income in Westwen China for Han

	(1)	(2)	(3)	(4)	(5)	(6)
	Han-Female			Han-Male		
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Han-Minzu Intermarriage	0.1336**	.	-0.0164	0.0766	.	-0.1007
	(0.0672)	(.)	(0.4640)	(0.0495)	(.)	(0.4331)
Living in Rural	-1.2671***	-0.1033***	-1.2816***	-1.2483***	-0.0995***	-1.2454***
	(0.0672)	(0.0190)	(0.0721)	(0.0489)	(0.0167)	(0.0578)
Muslim	-0.2574	0.3236**	-0.2070	-0.3489*	0.0072	-0.2574
	(0.2557)	(0.1528)	(0.4690)	(0.1821)	(0.1261)	(0.2557)
Age	0.0453**	-0.0012	0.0353*	0.0349**	0.0133**	0.0373**
	(0.0225)	(0.0066)	(0.0192)	(0.0164)	(0.0061)	(0.0165)
Age squared	-0.0006**	0.0000	-0.0005**	-0.0005***	-0.0002**	-0.0005***
	(0.0003)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
CCP membership	0.2407***	0.0300	0.2446***	0.1572***	0.0008	0.1563***
	(0.0631)	(0.0252)	(0.0744)	(0.0468)	(0.0175)	(0.0453)
College or higher degree	0.7509***	0.0877***	0.7534***	0.3560***	0.0693**	0.3726***
	(0.0761)	(0.0329)	(0.1042)	(0.0597)	(0.0278)	(0.0775)
Some college but not a four-year degree	0.5540***	0.0847***	0.5614***	0.2687***	0.0720***	0.2861***
	(0.0659)	(0.0261)	(0.0870)	(0.0580)	(0.0236)	(0.0698)
Self employed	0.3101***	0.0241	0.3203***	0.3677***	-0.0060	0.3734***
	(0.0731)	(0.0247)	(0.0728)	6.5891	(0.0201)	(0.0519)
Migrant worker	0.9797***	0.0433	0.9843***	(0.0639)	-0.0058	0.5605***
	(0.0926)	(0.0301)	(0.0904)	9.1584	(0.0222)	(0.0571)

	Han-Female			Han-Male		
	OLS	IV First Stage	IV Second Stage	OLS	IV First Stage	IV Second Stage
Ever had a local equal protection clause of Han-Ethnic Minzu		-0.0451*			0.1013**	
		(0.0251)			(0.0395)	
Support Han-Minzu Intermarriage		0.0997***			0.0795***	
		(0.0171)			(0.0148)	
Constant	8.6978***	0.1054	8.9455***	9.4738***	-0.3411**	9.6636***
	(0.4690)	(0.1363)	(0.3954)	(0.3466)	(0.1337)	(0.3418)
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,015	1,973	1,973	2,690	2,641	2,641
R2-adjusted	0.381	0.154	0.378	0.393	0.127	0.387
Chi-squared			1227			1703

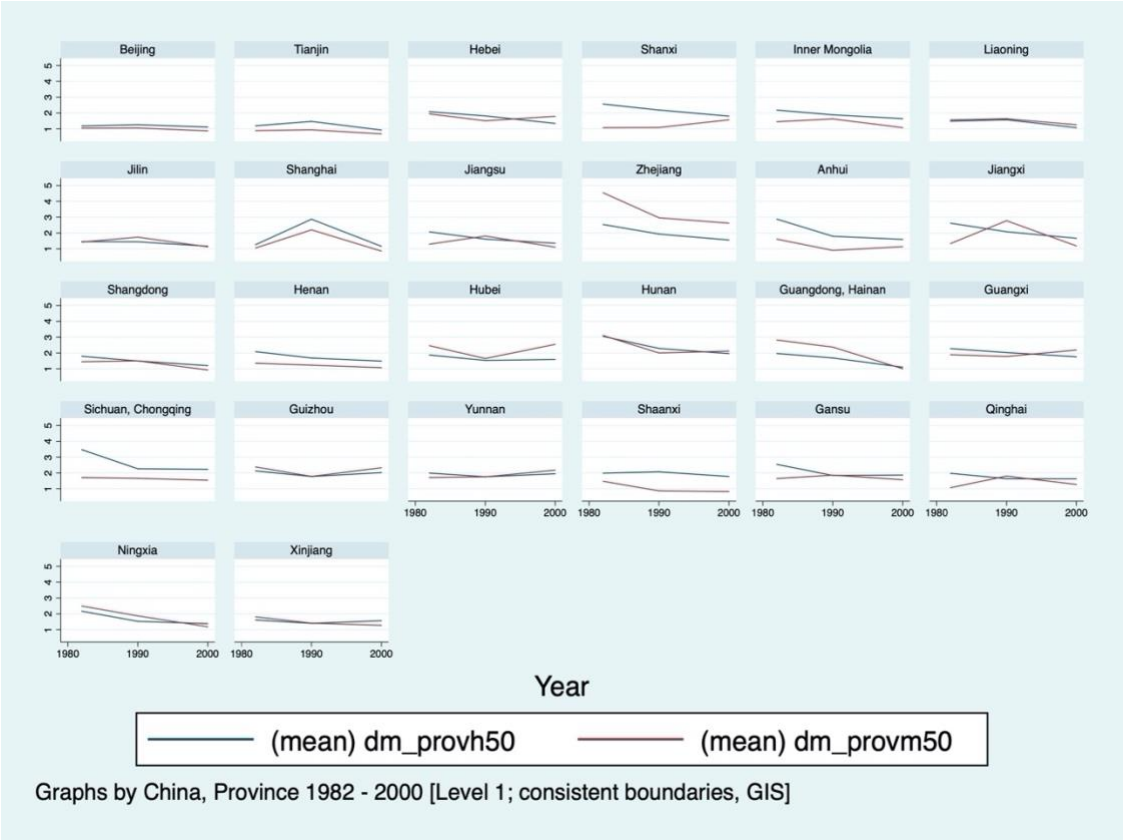
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: CHES 2011.

Note: Appendix Table 1.4 includes married Han individuals between ages 16-60.

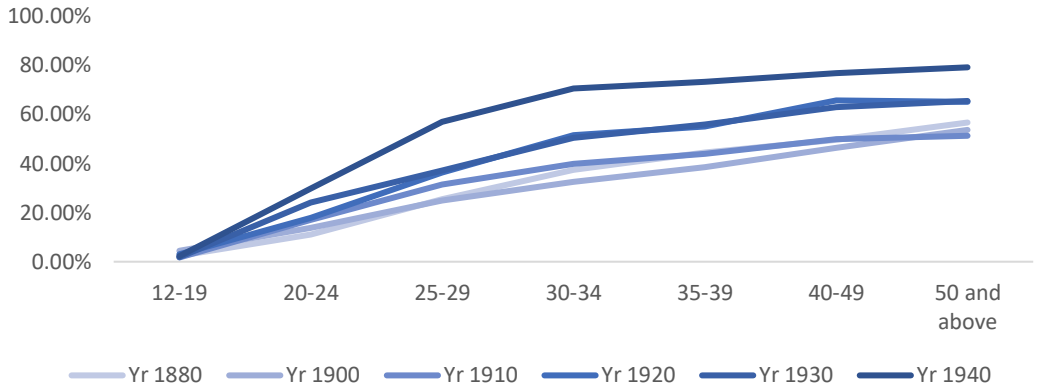
Appendix Figure 2.1: Revised D-M Ratio by Provinces, Same Upper Age Bound for Males and Females



Source: IPUMS-I 1% China Census, 1982-2000.

Note: D-M Ratio equals to unmarried employed males to unmarried females, between ages 20—50.

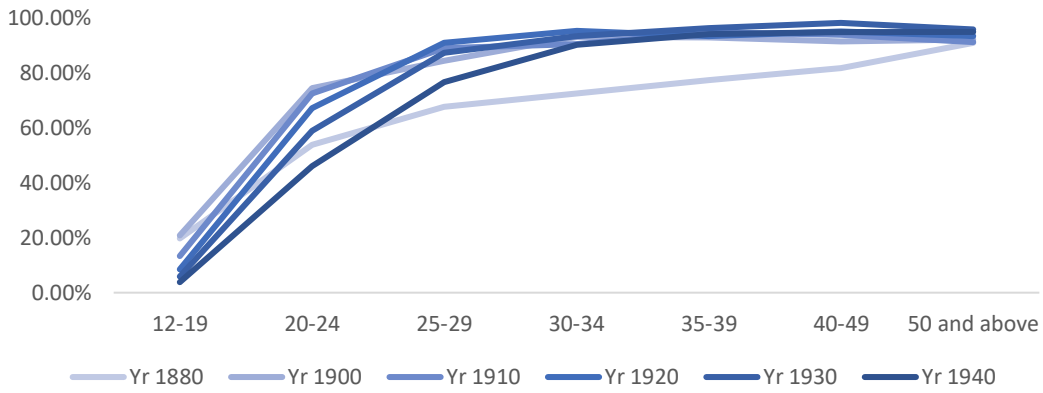
Appendix Figure 3.1A: Percentage of Chinese Men Ever Married, by Age and Census



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Appendix Figure 3.1.A includes Chinese men aged 20 and over.

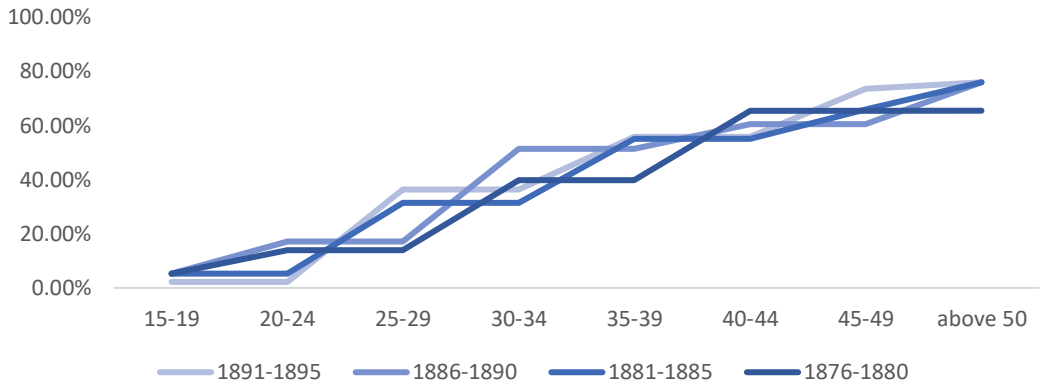
Appendix Figure 3.1.B: Percentage of Chinese Women Ever Married, by Age and Census



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Appendix Figure 3.1.B includes Chinese women aged 20 and over.

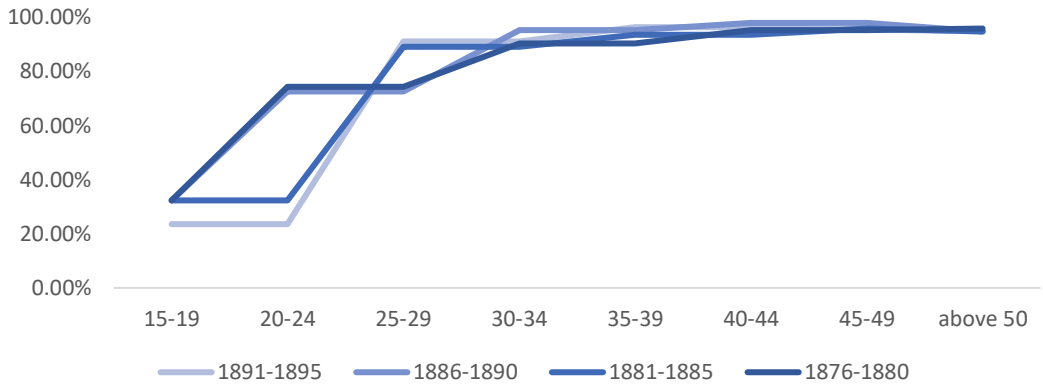
Appendix Figure 3.2.A: Percentage of Chinese Men Ever Married, by Age and Birth Cohort



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Appendix Figure 3.2.A includes Chinese men aged 20 and over.

Appendix Figure 3.2.B: Percentage of Chinese Women Ever Married, by Age and Birth Cohort



Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Appendix Figure 3.2.B includes Chinese women aged 20 and over.

Appendix Table 3.1: Race of Spouse for Intermarried Chinses Females Age 20 and over, 1880-1940 Censuses

	1880	1900	1910	1920	1930	1940
White Male	77.78%	85.19%	55.56%	66.67%	100.00%	85.71%
Black Male	11.11%	/	/	/	/	8.93%
Mulatto	11.11%	/	/	2.30%	/	/
Other Asians	/	14.81%	44.44%	20.00%	/	5.36%
Total	100%	100%	100%	100%	100%	100%

Source: IPUMS-USA Complete Count for 1880 –1940.

Note: Appendix Table 3.1 includes all the intermarried Chinese aged 20 and over.

Appendix Table 3.2: Event History Analysis of Impact of Chinese Anti-Miscegenation Laws

		(1)	(2)
Census before passage of Asian/Chines anti-miscegenation law			
	-3	0.0139	0.0167
		(0.0255)	(0.0254)
	-2	-0.0034	-0.0044
		(0.0120)	(0.0121)
	-1	-0.0015	-0.0021
		(0.0109)	(0.0109)
P-value test of joint significance		**0.7998**	**0.7028**
Law passage		-0.0085	-0.0087
		(0.0113)	(0.0111)
Census after passage of Asian/Chines anti-miscegenation law			
	1	-0.0024	-0.0026
		(0.0084)	(0.0078)
	2	-0.0030	-0.0031
		(0.0072)	(0.0067)
	3	-0.0052	-0.0043
		(0.0070)	(0.0066)
	4	-0.0088	-0.0076
		(0.0062)	(0.0059)
	5	-0.0003	0.0006
		(0.0043)	(0.0040)
P-value test of joint significance - years 0-5		**0.1232**	**0.4498**
P-value test of joint significance - years 1-5		**0.0778**	**0.3453**
Chinatown in City			-0.0022**
			(0.0009)
US Born			0.0133***
			(0.0042)
Illiteracy			-0.0048**
			(0.0023)
Skewed sex ratio (=1 if sex ratio>=10)			0.0029
			(0.0019)
Constant		0.0574***	0.0564***
		(0.0132)	(0.0139)
Observations		241,463	239,074

Source: IPUMS-USA Complete Count for 1880 –1940.

Notes: Appendix Table 3.2 includes all the intermarried Chinese men aged 20 and over.

Standard errors clustered on state in parentheses. *** p<0.01, ** p<0.05, *p<0.1.